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South Canyon Fire Investigation

of the 14 fatalities
that occurred on
July 6, 1994 near
Glenwood Springs,
Colorado



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U.S. Department of the Interior
Bureau of Land Management
Washington, D.C. 20240



U.S. Department of Agriculture
Forest Service
Washington, D.C. 20090

Memorandum

AUG 19 1994

To: Claudia P. Schechter
Designated Agency Safety and Health Official,
Department of the Interior

Wardell Townsend
Designated Agency Safety and Health Official,
Department of Agriculture

From: Acting Director, Bureau of Land Management
Chief, Forest Service

Subject: Joint Report of Investigation of South Canyon Fire

In accordance with the safety investigation procedures of our respective Departments, we hereby transmit to you the attached Report of the South Canyon Fire Accident Investigation Team and the Team's Letter of Transmittal/Investigative Report. We have established an Interagency Management Review Team to serve as a steering group to review the findings and conclusions of the Investigation Team, review and refine the Team's recommendations, and propose a plan for corrective action. A copy of the corrective action plan will be submitted to you upon its completion. In the meantime, we have adopted the Team's recommendations as interim measures.

We have decided to release both parts of the Investigation Team's Report publicly for two reasons. First, after reviewing the findings and conclusions in the Report, we have adopted the Team's recommendations as interim measures, subject to further refinement by the Interagency Management Review Team. Second, the intention of both the Bureau of Land Management and the Forest Service from the outset was to release the Report in its entirety to the public, and the investigation was conducted with that intention in mind.

You will find that some information has been deleted from several of the witness statements included in the report. We have removed personal privacy information (home addresses and telephone, social security and driver's license numbers, and dates of birth) provided by several witnesses on their statement forms. Any deletions from the body of the statements reflect the witnesses' own corrections.

Mike Dombeck
Director,
Bureau of Land Management

Jack Ward Thomas
Chief,
Forest Service



Letter of Transmittal/ Investigative Report

South Canyon Fire

Summary

On July 2, 1994, during a year of drought and at a time of low humidity and record high temperatures, lightning ignited a fire 7 miles west of Glenwood Springs, Colorado. The fire was reported to the Bureau of Land Management on July 3 as being in South Canyon, but later reports placed it near the base of Storm King Mountain. The fire began on a ridge, which was paralleled by two canyons or deep drainages, called the east and the west drainages. In its early stages the fire burned in the pinyon-juniper fuel type and was thought to have little potential for spread.

Dry lightning storms had started 40 new fires in BLM's Grand Junction District in the 2 days before the South Canyon fire started, requiring the District to set priorities for initial attack. Highest priority was given to fires threatening life, residences, structures, and utilities, and to fires with the greatest potential for spread. All initial attack firefighting resources on the Grand Junction District were committed to the highest priority fires. In response to a request from the Grand Junction District, the Garfield County Sheriff's Office and White River National Forest monitored the South Canyon fire.

Over the next 2 days the South Canyon fire increased in size, the public expressed more concern about it, and some initial attack resources were assigned. On the afternoon of July 4 the District sent two engines. Arriving at 6:30 p.m. at the base of the ridge near Interstate 70, the crew sized up the fire but decided to wait until morning to hike to the fire and begin firefighting efforts.

The next morning, a seven person BLM/Forest Service crew hiked 2 and 1/2 hours to the fire, cleared a helicopter landing area (Helispot 1) and started building a fireline on its southwest side. During the day an air tanker dropped retardant on the fire. In the evening the crew left the fire to repair their chainsaws. Shortly thereafter, eight smokejumpers parachuted to the fire and received instructions from the Incident Commander to continue constructing fireline. The fire had crossed the original fireline so they began a second fireline from Helispot 1 downhill on the east side of the ridge. After midnight they abandoned this work due to the darkness and the hazards of rolling rocks.

On the morning of July 6 the crew returned to the fire and worked with the smokejumpers to clear a second helicopter landing area (Helispot 2). Later that morning eight additional smokejumpers parachuted to the fire. They were assigned to build the fireline on the west flank. Later, 10 Prineville Interagency Hotshot Crew members arrived, and 9 joined the smokejumpers in line construction. The remaining members of the hotshot crew upon arrival were sent to help reinforce the fireline on the ridgetop.

At 3:20 p.m. a dry cold front moved into the fire area. As winds and fire activity increased, the fire made several rapid runs with 100-foot flame lengths within the existing burn. At 4:00 p.m. the fire crossed the bottom of the west drainage. It spread up the drainage on the west side. It soon spotted back across the drainage to the east side beneath the firefighters and moved onto steep slopes and into dense, highly flammable Gambel oak. Within seconds a wall of flame raced up the hill toward the firefighters on the west flank fireline. Failing to outrun the flames, 12 firefighters perished. Two helitack crew members on the top of the ridge also died when they tried to outrun the fire to the northwest. The remaining 35 firefighters survived by escaping out the east drainage or seeking a safety area and deploying their fire shelters.

Findings and Recommendations

The South Canyon fire at the time of the blowup affected 49 firefighters in several separate locations. All were in very hazardous situations. Firefighters who died were directly in the path of the flames. Other firefighters used escape routes to reach safety. Eight firefighters deployed fire shelters within the fire area and survived their entrapment.

Twelve Fatalities on Southwest Flank Line

The twelve fatalities resulted from a combination of factors. The crew was building a direct attack fireline downhill in Gambel oak. Surface fuels had been burned, but aerial fuels were still present and unburned. The investigation found that many of the 18 Watch Out Situations and the 10 Standard Fire Orders were either compromised, not recognized, or proper action was not taken.

Critical changes in weather and fire behavior were not recognized and not acted on soon enough for firefighters to escape. Firefighters did not receive or request spot weather forecasts from the Grand Junction District Dispatch.

Even though some of the firefighters expressed concern that they were at risk building the fireline downhill, they had enough confidence that they could stop the fire near the bottom of the canyon. Some firefighters knew a cold front was approaching and thought that they could line the west flank before the cold front arrived. Unfortunately, the cold front arrived before the fireline was completed.

Two Helitack Fatalities

The two helitack members were managing helicopter operations at Helispot 2. The escape route to the designated safety zone at Helispot 1 was blocked by the rapidly moving fire. Therefore, crews were directed off the ridge into the east drainage. The two helitack members ran north up the ridgeline to escape the fire. In this attempt, they were overcome by the fire.

A. Weather, Fire Danger, and Fire Behavior

Critical fire behavior and fire weather indicators of blowup conditions were not recognized by either fire managers or firefighters. Fire weather forecasts were not effectively communicated to the

firefighters on the fire, and no system was in place to alert people on the fire of significant weather changes. Although a fire weather meteorologist at the Western Slope Fire Coordination Center was available to give forecasts and briefings for specific wildfires, he was not used on the South Canyon fire. Within the firefighting organization there was also considerable confusion about the difference between what is meant by a red flag watch and a red flag warning.

Recommendations:

1. A national interagency review should be conducted of the National Weather Service's Red Flag Program, with emphasis on the number of watches and warnings issued. Distinguish clearly between red flags for cold fronts and high winds and red flags for lightning.
2. A fire behavior analyst should be available or requested whenever a fire weather meteorologist is requested for a fire coordination center. A fire behavior analyst can relate the weather forecast to how fires burn in terms of rate of spread, flame length and fireline intensity. These are terms that firefighters understand. An alternative is establishing regional centers for consolidating and interpreting fire behavior and weather information during periods of high fire activity.
3. Fire weather forecasts must be communicated to firefighters on initial attack and extended attack incidents.
4. Spot weather forecasts should be requested for fires that have potential for extreme fire behavior or exceed initial attack or are located in areas for which red flag warnings have been issued.
5. NOAA Weather Radio forecasts should not be substituted for fire weather forecasts. NOAA Weather Radio does not broadcast fire weather forecasts, but forecasts directed to the general public.
6. A national interagency strategy and implementation plan should be developed to improve technical transfer of fire danger and fire behavior technology.
7. The National Weather Service fire weather program is a critical part of the Interagency Fire Management Program. It is essential that it be maintained at present levels to ensure firefighter safety.
8. An organized live fuel moisture sampling network should be established for Gambel oak. Strategy and tactics should be adjusted on the basis of this information.

NOTE: The Gambel oak fuel type has been directly responsible for 17 firefighter fatalities since 1976 on the BLM Grand Junction District.

B. Leadership, Attitudes, and Training

A common response to situations of this nature is to recommend additional training. Although there are several specific training needs related to fire shelters, we believe that training is not the core issue. Rather it is one of implementing the training all firefighters receive.

Attitudes and leadership set the tone for execution of the training received. There is a dire need to create a passion for compliance with the basics of safe fire suppression. This will occur only if leadership sets and demonstrates a clear commitment to safety.

Recommendations:

1. Attitudes and leadership are universal factors that influence safe fire suppression. The Interagency Management Review Team should explore actions that will strengthen sensitivity to basic safety standards so they permeate every fiber of our strategy, tactics, and basic fire operations.
2. The Interagency Management Review Team needs to evaluate current training to assure emphasis is placed on the basics of fire behavior, firefighting strategies and tactics, the 10 Standard Fire Orders, and the 18 Watch Out Situations.
3. The South Canyon fire incident should be used in the development of a training exercise for use by agency administrators, fire managers, dispatchers, and firefighters. The training exercise should be developed by field level firefighters.
4. The Investigation Team recommends that the National Wildfire Coordinating Group develop mandatory fire shelter training courses and implement them prior to the 1995 fire season. The main course should be required every 2-4 years with yearly refresher training. Courses should emphasize timed practice deployments, proper deployment practices, deployment in high winds, and site selection.
5. The Interagency Management Review Team should charter a group to develop guidelines for adequate deployment sites and safety zones in different heat and flame scenarios to show the value and the limitations of the fire shelters. Followup training should include recognition of survivable shelter deployment sites and safety zones.
6. Fire behavior and fire weather concepts should be reviewed in training each year for all fire managers.
7. "Standards for Survival" and "Look Up, Look Down, Look Around" training materials were developed in response to previous entrapment investigations. The Team recommends that all firefighters be required to take these subjects and review them every 2 years to maintain firefighting qualifications.
8. Fire shelter training materials should be revised to stress discarding packs and equipment when escape is questionable and that it is no longer acceptable to take packs and equipment into fire shelters.

C. Management Support and Dispatch Coordination

The Investigation Team concentrated on the direct causes of the fatalities on the South Canyon fire. We identified a number of findings related to management support and dispatch coordination. We also identified incident management, control mechanisms, and support structure as contributory causes.

Recommendations - Management Review

1. We recommend a management review of the Fire and Aviation Programs for the BLM State of Colorado to address policy direction; accountability mechanisms; training and qualifications of personnel; and staffing, including budget, workload, and FTE controls.
2. The review should also address the implementation of National Wildfire Coordinating Group's work, rest, and rotation guidelines.

D. Mobilization Planning for Above-Average Fire Seasons

Droughts are part of the climatological pattern, particularly in the western United States. Colorado's West Slope was in extreme drought as determined by the Palmer Drought Index. Glenwood Springs has had 8 straight months of below-normal precipitation. Precipitation since October 1993 had been 58 percent of normal.

The Grand Junction District was experiencing a severe fire season. Fire danger indices in early July were at maximum recorded levels in 21 years. As of early July the number of fires were twice the annual average. Type I and Type II incident management teams had responded to five times the number of fires that they would respond to in a normal year.

Recommendations:

1. As part of the management review, special attention should be given to analysis of how all federal, state, and local firefighting organizations plan and conduct fire operations to respond to wide variations in fire severity from season to season.
2. Procedures should be established to monitor the level of drought at representative fire weather stations. Present fire danger levels should be compared to historic averages and worst case conditions, and the selection of appropriate suppression response should be adjusted on the basis of this information.

Conclusion

Firefighters and fire managers are engaged in a complex business with inherent risks, which requires skill, good judgment, and the ability to make difficult decisions. The South Canyon fire tragedy resulted from a series of judgments, decisions, events, and actions with serious cumulative impacts.

No one person or unit recognized the interaction of all factors on the incident that resulted in the entrapments. Firefighting safety fundamentals were compromised during a period of extreme weather and fire behavior in a highly flammable fuel type. This situation, compounded by failure to provide critical fire weather and fire behavior information to the firefighters, was the primary cause of the injuries and fatalities.



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Report of the South Canyon Fire Accident Investigation Team

August 17, 1994

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Report of the South Canyon Fire Accident Investigation Team

Report Accepted:



Mike Dombeck
Director
Bureau of Land Management

8/17/94

Date



Jack Ward Thomas
Chief
U.S. Forest Service

8/17/94

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Report of the South Canyon Fire
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Glenwood Springs, Colorado
August 18, 1994

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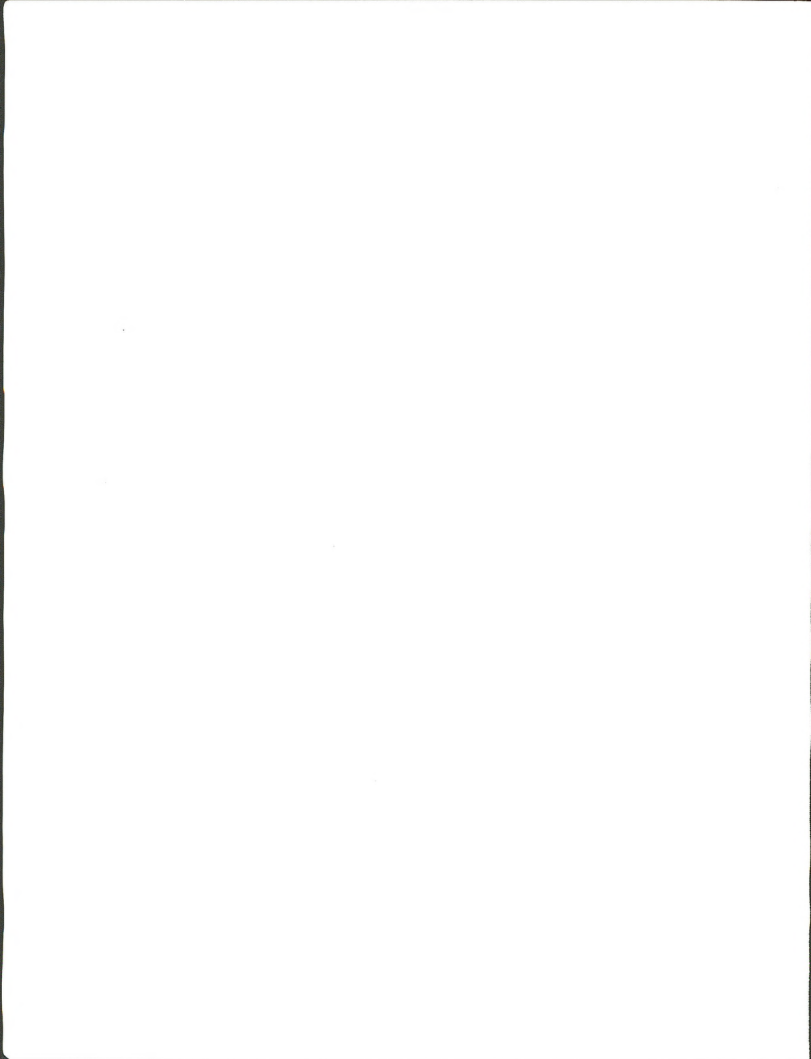
Roger Roth

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May We All Be Energized And Inspired To Be Ever Aware
Of The Lessons Learned From Their Sacrifice

Report Of The South Canyon Fire Accident Investigation Team



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Preface

Firefighters and fire managers are engaged in a complex business that has inherent risks and requires skill, good judgment, and the ability to make difficult decisions. The South Canyon Fire tragedy resulted from a series of judgments, decisions, events, and actions with serious cumulative impacts. None of the people involved would have knowingly made decisions that led to the deaths of 14 firefighters.

The South Canyon Fire Interagency Investigation Team did not come to this assignment with any preconceived notions of why the accident occurred. Rather we came determined to be as factual, complete, and analytical as possible. We feel a strong responsibility to wildland firefighters everywhere, particularly those who lost their lives in this incident, to help reduce the risk of a recurrence of the deep, personal loss experienced in the South Canyon fire. Our report is presented to the Chief of the Forest Service and the Director of the Bureau of Land Management. We also request that each of you review the findings and analysis of causal factors. We further ask you to resolve to provide the leadership needed to give an extra margin of safety in all that we do and thus prevent a recurrence. We express our sincere thanks to each person who contributed to the investigation.



Executive Summary

The Incident

On July 2, 1994, during a year of drought and at a time of low humidity and record high temperatures, lightning ignited a fire 7 miles west of Glenwood Springs, Colorado. The fire was reported to the Bureau of Land Management on July 3 as being in South Canyon, but later reports placed it near the base of Storm King Mountain. The fire began on a ridge, which was paralleled by two canyons or deep drainages, called in this report the east and the west drainages. In its early stages the fire burned in the pinyon-juniper fuel type and was thought to have little potential for spread.

Dry lightning storms had started 40 new fires in BLM's Grand Junction District in the 2 days before the South Canyon fire started, requiring the District to set priorities for initial attack. Highest priority was given to fires threatening life, residences, structures, utilities, and to fires with the greatest potential for spread. All initial attack firefighting resources on the Grand Junction District were committed to the highest priority fires. In response to a request from the Grand Junction District, the Garfield County Sheriff's Office and White River National Forest monitored the South Canyon Fire.

Over the next 2 days the South Canyon Fire increased in size, the public expressed more concern about it, and some initial attack resources were assigned. On the afternoon of July 4 the District sent two engines. Arriving at 6:30 p.m. at the base of the ridge near Interstate 70, the crew sized up the fire but decided to wait until morning to hike to the fire and begin firefighting efforts.

The next morning, a seven person BLM/Forest Service crew hiked 2 1/2 hours to the fire, cleared a helicopter landing area (Helispot 1) and started building a fireline on its southwest side. During the day an air tanker dropped retardant on the fire. In the evening the crew left the fire to repair their chainsaws. Shortly thereafter, eight smokejumpers parachuted to the fire and received instructions from the Incident Commander to continue constructing the fireline. The fire had crossed the original fireline, so they began a second fireline from Helispot 1 downhill on the east side of the ridge. After midnight they abandoned this work due to the darkness and the hazards of rolling rocks.

On the morning of July 6 the BLM/Forest Service crew returned to the fire and worked with the smokejumpers to clear a second helicopter landing area (Helispot 2). Later that morning eight more smokejumpers parachuted to the fire and were assigned to build the fireline on the west flank. Later, ten Prineville Interagency Hotshot Crew members arrived, and nine joined

the smokejumpers in line construction. Upon arrival, the remaining members of the hotshot crew were sent to help reinforce the fireline on the ridgetop.

At 3:20 p.m. a dry cold front moved into the fire area. As winds and fire activity increased, the fire made several rapid runs with 100-foot flame lengths within the existing burn. At 4:00 p.m. the fire crossed the bottom of the west drainage and spread up the drainage on the west side. It soon spotted back across the drainage to the east side beneath the firefighters and moved onto steep slopes and into dense, highly flammable Gambel oak. Within seconds a wall of flame raced up the hill toward the firefighters on the west flank fireline. Failing to outrun the flames, 12 firefighters perished. Two helitack crew members on the top of the ridge also died when they tried to outrun the fire to the northwest. The remaining 35 firefighters survived by escaping out the east drainage or seeking a safety area and deploying their fire shelters.

The Investigation

Within 3 hours of the blowup, an interagency team was forming to investigate the entrapment on the South Canyon fire. The team first met on the evening of July 7. Team members were given their assignments, and the team presented a charter to the Chief of the USDA Forest Service and the Director of the Bureau of Land Management. Les Rosenkrance, BLM's Arizona State Director, was designated team leader.

In the next few days the team investigated the fire and fatality sites and began a series of 70 interviews with witnesses. In addition, the team met once or twice a day to discuss progress, clarify assignments, plan their report, and review their findings. On July 22, with the interviews and much of the investigation report completed, the team adjourned. The following week some team members met in Phoenix, Arizona to complete work on the incident overview. On August 9-11, the team reconvened to review a draft of the completed report in preparation for its publication.

Causal Factors

Direct Causes

The Investigation Team determined that the direct causes of the entrapment in the South Canyon fire are as follows.

Fire Behavior

Fuels

- Fuels were extremely dry and susceptible to rapid and explosive spread.
- The potential for extreme fire behavior and reburn in Gambel oak was not recognized on the South Canyon fire.

Weather

- A cold front, with winds of up to 45 mph, passed through the fire area on the afternoon of July 6.

Topography

- The steep topography, with slopes from 50 to 100 percent, magnified the fire behavior effects of fuel and weather.

Predicted Behavior

- The fire behavior on July 6 could have been predicted on the basis of fuels, weather, and topography, but fire behavior information was not requested or provided. Therefore critical information was not available for developing strategy and tactics.

Observed Behavior

- A major blowup did occur on July 6 beginning at 4:00 p.m. Maximum rates of spread of 18 mph and flames as high as 200 to 300 feet made escape by firefighters extremely difficult.

Incident Management

Strategy and Tactics

- Escape routes and safety zones were inadequate for the burning conditions that prevailed. The building of the west flank downhill fireline was hazardous. Most of the guidelines for reducing the hazards of downhill line construction in the Fireline Handbook (PMS 410-01) (see box on next page) were not followed.
- Strategy and tactics were not adjusted to compensate for observed and potential extreme fire behavior. Tactics were also not adjusted when Type I crews and air support did not arrive on time on July 5 and 6.

Safety Briefing and Major Concerns

- Given the potential fire behavior, the escape route along the west flank fireline was too long and too steep.
- Eight of the 10 Standard Firefighting Orders were compromised.
- Twelve of the 18 Watch Out Situations were not recognized, or proper action was not taken.
- The Prineville Interagency Hotshot Crew (an out-of-state crew) was not briefed on local conditions, fuels, or fire weather forecasts before being sent to the South Canyon fire.

Involved Personnel Profile

- The "can do" attitude of supervisors and firefighters led to a compromising of Standard Firefighting Orders and a lack of recognition of the 18 Watch Out Situations.
- Despite the fact that they recognized that the situation was dangerous, firefighters who had concerns about building the west flank fireline

questioned the strategy and tactics but chose to continue with line construction.

Equipment

- Personal protective equipment performed within design limitations, but wind turbulence and the intensity and rapid advance of the fire exceeded these limitations or prevented effective deployment of fire shelters.
- Packs with fuses taken into a fire shelter compromised the occupant's safety.
- Carrying tools and packs significantly slowed escape efforts.

Contributory Causes

The following factors contributed to the entrapment on the South Canyon fire.

Incident Management and Control Mechanisms

- The initial suppression action was delayed for 2 days because of higher priority fires on the Grand Junction District.
- Air support was inadequate for implementing strategies and tactics on July 6.

Support Structure

- The above-normal fire activity overtaxed a relatively small firefighting organization at the Grand Junction District and Western Slope Fire Coordination Center.
- Detailed fire weather and fire behavior information was not given to firefighters on the South Canyon fire.
- Dispatching procedures and communications with the Incident Commander did not give a clear understanding of what resources (crews and air support) would be provided to the fire in response to requests and orders.
- Unclear operating procedures between the Western Slope Fire Coordination Center and the Grand Junction District's fire organizations resulted in confusion about priority setting, operating procedures, and availability of firefighting resources, including initial attack resources (i.e. helitack firefighters, smokejumpers, and retardant aircraft). This lack of definition limited the effectiveness in the timing and priority of the suppression of the South Canyon fire.
- The lack of Grand Junction District and Colorado State Office management oversight, technical guidance, and direction resulted in uncertainty concerning the roles and responsibilities of the Western Slope Fire Coordination Center and the Grand Junction District.

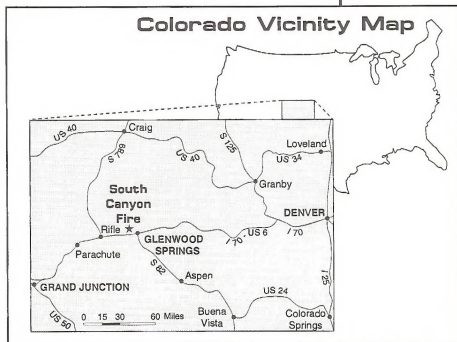
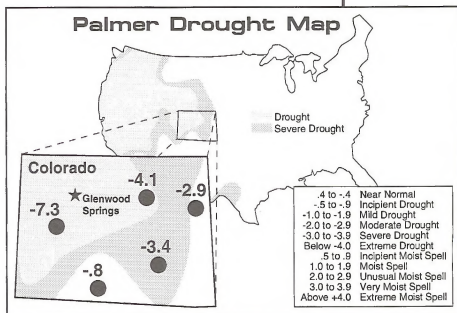
Incident Overview

Background

Colorado experienced record high temperatures during June of 1994. A weather pattern of dry thunderstorms caused a rash of wildfires. Red flag watches and warnings were issued for western Colorado based on forecasts for dry thunderstorms with strong and gusty winds. Western Colorado was in extreme drought, as shown on the July 9 Palmer Drought Index map. The Glenwood Springs area had received only 58 percent of normal precipitation since October 1993.

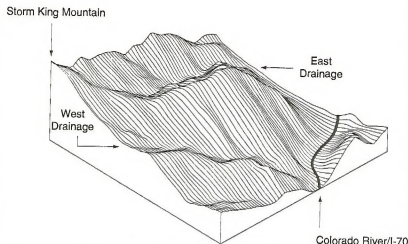
The Bureau of Land Management's Grand Junction District was experiencing a severe fire season. Fire danger indices for July were at the highest levels recorded in 21 years. As of early July the number of fires was twice the annual average. Type I and II incident management teams had responded to five times the number of fires that they would respond to in a normal year. The district's Management Team had issued a directive that all fires be initial attacked and suppressed as soon as possible. Statewide fire prevention restrictions were issued for Colorado on June 29, 1994.

The South Canyon fire occurred about 7 miles west of Glenwood Springs in west-central Colorado, burning about 2,000 acres in the 3-day period of July 3-6. The fire site, which adjoins Interstate 70 and the Colorado River, straddles a ridge extending off of Storm King Mountain. The ridge is paralleled to



South Canyon Fire

3-D Figure of Fire Area



the east and west by two major canyons or drainages that lead to the Colorado River. This report calls these canyons the east and west drainages. The fire was first reported to be in South Canyon, but later reports placed it near the base of Storm King Mountain.

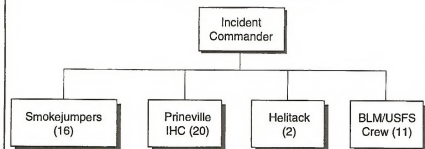
At the time of the blowup on July 6, the South Canyon fire was considered an extended attack fire—a fire of generally less than 100 acres that has not quickly been brought under control by the initial suppression

actions and requires more firefighting resources. The South Canyon fire had not yet reached a level of organizational complexity which required a designated "overhead team" of fire supervisors to assume control.

As is typical in extended attack situations, firefighting groups arrived on the fire at intervals from dispersed locations and blended into the existing organization. Also typical was the assignment of the highly trained hotshot crew and smokejumpers to the most difficult portions of the fire.

The following daily account describes the events that preceded the accident.

Organization of South Canyon Extended Attack Team



July 2

The South Canyon fire was ignited by lightning on the afternoon of July 2, 1994.

July 3

The Grand Junction District was in very high to extreme fire danger, with 90 percent of its firefighting resources committed to fires. Lightning storms, during the previous 2 days had resulted in more than 40 new fires, and the district had developed a priority list for initial attack. Highest priority was given to fires threatening residences, structures, and utilities, and to fires with the highest potential for spread. A red flag warning was issued for dry lightning, and strong winds hampered the effective use of aircraft in fighting wildland fires.

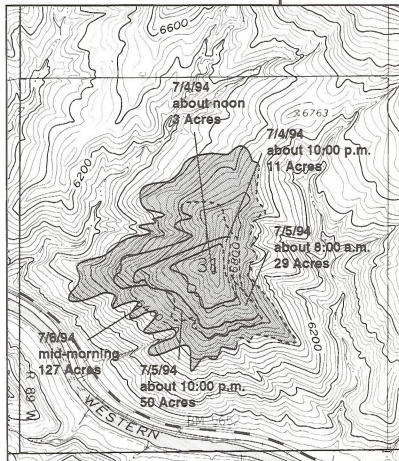
At 11 a.m. the Garfield County Sheriff reported the South Canyon fire to the Grand Junction District Dispatch Center. This fire was located on a hilltop above Interstate 70 about 7 miles west of Glenwood Springs. The District Fire Control Officer was notified of the fire and drove to the scene. Dispatch called the Western Slope Fire Coordination Center in Grand Junction and requested one load (eight) of smokejumpers, an air tanker, and a lead plane to respond to this and other fires reported in the area.

BLM Engine Crew E611 arrived at the scene and met with the Garfield County Sheriff. The Engine Foreman completed the initial sizeup and confirmed that the fire was on BLM-administered land. With only the flaming canopies of two trees visible, this fire seemed to have a low spread potential. The Engine Foreman recommended that the fire be observed until firefighting resources could be obtained. There were higher priority fires, slopes were steep, the fire was inaccessible, and rates of spread were slow. The Grand Junction District Fire Control Officer arrived at the scene and agreed with the Engine Foreman's assessment and recommendation.

Three aircraft—Lead 64, Jumper 49, and Air Tanker 14—were diverted to other priority fires in the area. The Fire Control Officer arrived back in Grand Junction to assess fire activity and plan for the next day. He called the Western Slope Fire Coordination Center and requested more firefighting resources for the South Canyon fire. He also called for Grand Junction District firefighting resources to be released from the Copper Spur fire in the Craig District for reassignment to the South Canyon fire.

July 4

Five new fires started on July 4, two of which exceeded 100 acres. In addition, 31 existing fires remained uncontrolled. Local initial attack forces were committed to other fires. Radio communication was inadequate for the fire load and was recognized as a potential problem for safe and effective aircraft use. Fire danger throughout the district was very high to extreme. More lightning was forecast for that evening. Red flag warnings were issued.



South Canyon Fire

The South Canyon fire was given a higher priority for receiving firefighting resources in response to concerns of Glenwood Springs residents. At 2:50 p.m. the White River National Forest, Sopris Ranger District informed Grand Junction District Dispatch that it had received a telephone call from

a resident concerned about the fire and that in response it was sending an engine crew to the fire site. At 3:40 p.m. the Sopris Ranger District reported to Dispatch that the fire posed no danger to structures. Dispatch responded that a BLM engine crew was enroute to the fire site.



Photo 1. The South Canyon fire at noon on July 4.

At 6:30 p.m. the Incident Commander, and BLM and Forest Service firefighters met at the bottom of the hill. They sized up the fire and decided that because of darkness and steep terrain they would hike up to attack the fire early on July 5. Later that evening a Forest Service aerial observer

reported that "The fire is in steep and inaccessible terrain. It is burning to the northeast on the ridge. The area is too steep for crews and has few if any escape routes. The fire is actively burning in all directions. Helicopters with buckets could be very effective." The Grand Junction District Fire Management Officer and the Manager of the Western Slope Fire Coordination Center discussed the need for more resources for the fire.

From noon to 10 p.m on July 4 the fire had grown from 3 to 11 acres. The photo and fire map show the fire at noon.

July 5

The morning briefing at the Western Slope Fire Coordination Center called for red flag warnings and very high to extreme fire danger. A BLM crew of seven walked into the fire from the east drainage. The crew cut helispot 1—a helicopter landing area—on the ridge above the fire and began direct fireline construction downhill along the fire edge below the helispot. The Incident Commander ordered another district engine crew, a helicopter, and a 20-person crew. A load of eight smokejumper was substituted for the 20-person crew and was sent to the fire.

An air tanker drop was requested to support fireline construction. The first load of retardant was dropped along the fireline starting at the helispot. The Incident Commander and the air tanker pilot agreed that more retardant drops would be ineffective because of steep terrain and gusty winds.

The next air tanker drop was used to the south on the rocky slope overlooking the river and Interstate 70. The possibility of causing rocks to roll on the interstate restricted the further use of air tankers.

At 5:30 p.m. the Incident Commander and BLM crew left the fire to refurbish their equipment. Eight smokejumpers parachuted into the top of the fire at 5:45 p.m. and radioed the Incident Commander. The Incident Commander directed them to work on the fireline from the helispot downhill toward the west drainage.

The Jumper in Charge informed the Incident Commander that the fire had crossed their fireline and was burning actively. The jumpers then began building a fireline down the east side of the ridge. After sizing up the fire, the Jumper in Charge called Grand Junction District Dispatch and ordered two Type I crews.

On July 5 the fire grew from 29 acres at 8:00 a.m. to 50 acres at 10:00 p.m.

July 6

Thirty-six fires were burning in the Grand Junction District. The fire weather forecast for July 6 issued at 7:30 p.m. on July 5 for the Grand Junction area predicted increasing high clouds in the morning with winds of 10-20 mph by 11 a.m. and winds increasing to 15-30 mph by 1 p.m. By 3:00 p.m. surface winds would shift to the northwest at 15-25 mph and would gust to 30-35 mph with the passage of a cold front. A red flag warning had been issued for winds associated with the front.

Early in the morning (12:30 a.m.) the jumpers abandoned their line construction on the east side of the fire because of darkness and the hazards of rolling rocks. The fire continued

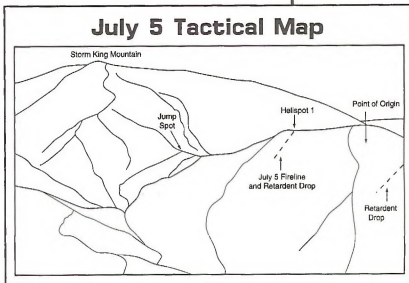
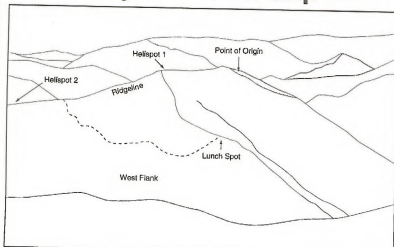


Photo 2. July 5 Tactical Map photo.

South Canyon Fire

to flare up throughout the night, and the jumpers become concerned about the fire burning over the jump site where they had left their parachutes and equipment.

July 6 Tactical Map



The Grand Junction Dispatcher summarized the fire weather forecast for the Incident Commander over the telephone. The forecast called for windy conditions with the passage of a cold front. At 4:30 a.m. the 11 BLM/Forest Service firefighters began their 3 1/2-hour hike back to the fire up the east drainage. Arriving at the fire sites they cleared Helispot 2.

At 5:30 a.m. the Jumper in Charge ordered a helicopter for gear removal and requested a fixed-wing aircraft with an aerial

observer. An hour later, Grand Junction Dispatch assigned the Prineville Interagency Hotshot Crew to the fire. The Jumper in Charge then requested that the hotshot crew be ferried into the fire by helicopter and that he have use of the helicopter for reconnaissance. Dispatch and the Jumper in Charge agreed that the helicopter would be used for reconnaissance instead of the fixed-wing aircraft and aerial observer. At 8:00 a.m. the Prineville Hotshot Crew departed from Grand Junction on a bus. Because of difficulties in acquiring tools and equipment, the hotshots did not arrive at the helibase until 11:00 a.m.

At 8:45 a.m. the Incident Commander and the Jumper in Charge discussed strategy and tactics for the day. The plan was to improve the fireline on the ridge between Helispots 1 and 2 and to have the eight jumpers and the Prineville Hotshot Crew start building a fireline along the fire's edge on the west flank.



Photo 3. July 6 Tactical Map photo.

At 9 a.m. the Incident Commander and several of the jumpers programmed their fire radios to the NOAA weather channel and received the following general Grand Junction area weather forecast: Windy and cooler, highs in the mid 80s, west to northwest winds 15 to 25 mph with some stronger gusts, sunny in the morning, partly cloudy by afternoon. In the evening, cooler with possible record low temperatures, lows 50 to 55, partially cloudy with isolated showers, decreasing northwest winds." The Grand Junction District Dispatch Center informed the Incident Commander that he could keep the smokejumpers on the fire and that eight more jumpers were headed his way.

At 9:30 a.m. helicopter 93R arrived on the fire but was limited to 4 hours flying time because of anticipated new fires. The Incident Commander and Jumper in Charge took a reconnaissance flight of the fire and directed the jumpers to start building a fireline downhill on the west flank. The Jumper in Charge and a jumper on the ground discussed the lack of safety areas on the fire. Followup discussion on the ground resulted in continuing the original plan.

At 10:30 a.m. the jumper aircraft arrived over the fire, and eight more smokejumpers parachuted down to the fire site. This group was used to reinforce line building on the west flank. At 12:30 p.m., the Prineville Hotshot Crew Superintendent and nine crew members arrived at Helispot 2 by helicopter. The Incident Commander, Jumper in Charge, and Hotshot Crew Superintendent discussed strategy and agreed to send nine hotshots down the west flank to reinforce the jumpers. The arrival of the second half of the hotshot crew was delayed so that the helicopter could be used to ferry equipment and for water drops on flareups.

At 1:00 p.m. a flareup on the west flank of the fire forced a group of jumpers to momentarily retreat up the fireline toward the top of the ridge. Several of the jumpers discussed their concerns about the safety of building the fireline. After a water drop from the helicopter cooled the flareup, the jumpers proceeded down the hill to continue building the fireline.

Between 12 noon and 1:00 p.m. winds in Grand Junction increased from 10 mph to 22 mph with gusts to 30 mph.

At 2:30 p.m. after a lunch break, three jumpers were instructed to work back up the west flank looking for hot spots and improving the line. The Line Scout continued south and down the hill past the end of the fireline to size up the next section of fireline.

At 3 p.m. the 10 other Prineville Hotshot Crew members arrived at Helispot 2 by helicopter and were instructed to help widen the fireline and put out spot fires along the ridge.

South Canyon Fire

At 3:20 p.m. a dry cold front with strong winds moved into the fire area. Fire activity immediately began to pick up.

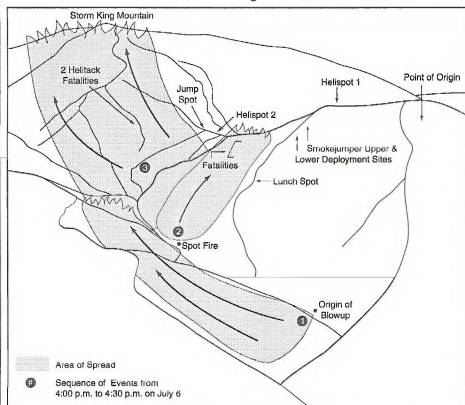


Photo 4. Fire behavior at 3:45 p.m.

At 3:45 p.m. the fire made several rapid runs with 100-foot flame lengths within the burned area just above the Line Scout. A short time later, helicopter water drops were called for on the west drainage and the ridgeline. At this point, fire activity was so intense that water drops were not effective.

At 4:00 p.m. the fire blew up. It crossed the west drainage at the base of the gully below the Line Scout. Within seconds a wall of flame raced up to the opposite ridge. A jumper who viewed the blowup called for the Line Scout to get out of the area. The Incident Commander directed the Jumper in Charge to bring the firefighters up from the bottom of the fireline. The jumper with the view of the blowup called the Jumper in Charge to tell him that the fire had crossed the main drainage and was "rolling."

Fire Blowup See photo 2 on pg. 17



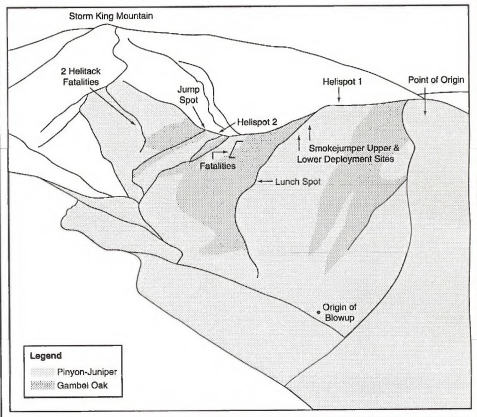
The fire rushed up the west side of the drainage pushed by 30-mph winds. In 10 to 12 minutes the fire had progressed up the canyon to a point across from the firefighters hiking up the fireline.

At 4:11 p.m., the Incident Commander called Dispatch to report that he was losing the fire on the side where the homes were and that he needed air tankers. At 4:20 p.m. an air tanker was dispatched.

Between 4:14 and 4:18 p.m. the fire was observed to spot back to the east side of the drainage below the crew that was walking out the fireline to the ridge. As the fire raced up the slope, it was influenced by stronger winds of 40 mph. The spot fire reached the ridgeline in 2 minutes. During the run the fire's rate of speed accelerated from 3 to 11 mph.

At the time of the accident 16 smokejumpers, 20 hotshots, a six-person helitack crew (two on the fire and four at the helibase), and 12 BLM/Forest Service firefighters (11 on the fire and 1 at the helibase) were assigned to the fire. The events occurring between 4 p.m. and 4:24 p.m. have been described separately to help clarify specific actions.

Fuel Types in Fire Area



1. Jumpers That Deployed Fire Shelters In The Safe Area

Shortly after the fire crossed the west drainage, at about 4:10 p.m., jumpers Keith Woods, Quentin Rhoades, Sonny Soto, Eric Shelton, Bill Thomas, Tony Petrelli, Michael Cooper, and Mike Feliciano met the Jumper in Charge Don Mackey at the lunch spot. Mackey told the jumpers to move up the ridge to a previously burned out safe area below Helispot 1.

Mackey then left to check on Line Scout Dale Longanecker and the other firefighters on the west flank. The eight jumpers headed quickly up the steep ridge attempting to reach the safety zone and distance themselves from the blowup. Part way up the hill the jumpers dropped their chainsaws and gasoline. For this group, dropping their equipment was acknowledging their serious situation. At this time the wind was blowing so hard that the jumpers had to use the chinstraps on their hardhats. During the ascent, the smokejumpers were enveloped in smoke and flying embers and could hear the roar of the fire. Once in the safety zone, they had difficulty deploying their fire shelters due to the 40 mph winds. Six deployed their shelters in

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one cluster, and the other two deployed slightly down the hill. By 4:24 p.m. all the firefighters in this group were in their shelters. They called Mackey but got no response.



Photo 5. Blow up between 4:30 and 5:00 p.m.

Petrelli described the fire as he experienced it from his fire shelter: "When in the shelters, the fire made three different runs on our right side, approximately 200 yards away. Inside the shelter it heated up to 110 degrees. During the hottest run there were glowing fire brands blowing into the shelter. Between fire runs we would peek out (of) the shelter. There was still heavy smoke coming from below us. The wind was still blowing ash and dust."

After 1 1/2 hours, they came out of their shelters and met Longanecker, who had safely endured the blowup near the lunch spot. He had not deployed his shelter.



Photo 6. Fireline and deployment sites.

2. The Group On The Ridgeline

At the time of the blowup Prineville Interagency Hotshot Crew Superintendent Tom Shepard and 10 crew members—Tom Rambo, Alex Robertson, Kip Gray, Mike Simmons, Bill Baker, Brian Lee, Tony Johnson, Louie Navarro, Kim Valentine, and Bryan Scholz and the BLM crew Michelle Ryerson, Jim Byers, Mike Hayes, Loren Paulson, Neal Shunk, Brian Rush, Todd Abbott, Eric Christianson, Derek Brixey, and jumpers Sarah Doehring and Sabinio Archuleta were on the ridgeline. At 4:04 p.m. the Incident Commander Butch Blanco gave the word for all firefighters on the ridge to proceed to the safety zone at Hellspot 1.

Before anyone could reach the safety zone, it became apparent that their path was cut off by an approaching wall of flame. Several crewleaders

ordered everyone to reverse directions toward Helispot 2 (the second designated helicopter landing area). From that point Blanco and other crewleaders directed everyone over the ridge and down the east drainage to the interstate. These firefighters safely escaped with only minor injuries.

According to Navarro, "As I looked up, I saw huge black clouds and red glare. The people in front said they couldn't make it to the black at H-1. As we turned back, I stayed in the rear to make sure everyone was together and going in the right direction. As I was coming out, I was flanked on both sides by fire. Some firefighters were tired and wanted to deploy. As we moved down the ridge, I could feel the fire on the west side gasp for air and then just surge like a tidal wave. When I reached the line that dropped off the hill, the fire was only on my left or west. It was hot and slamming against the ridge."

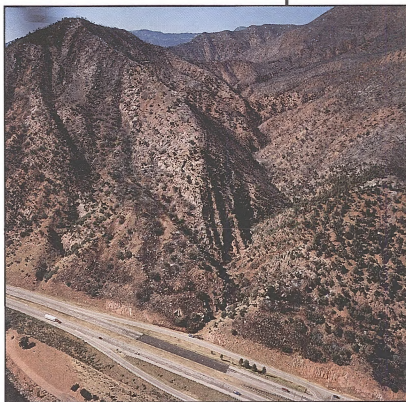


Photo 7. East drainage escape route.

Crews that dropped off the ridge fled down the east drainage. The wind blew the fire down this drainage, whose mouth was consumed in flames 30 to 40 minutes after the last firefighter escaped.

3. The Group On The West Flank

At the time of the blowup, Prineville Interagency Hotshot Crew members Jon Kelso, Kathi Beck, Scott Blecha, Levi Brinkley, Bonnie Holtby, Rob Johnson, Tami Bickett, Doug Dunbar, and Terri Hagen, and jumpers James Thrash, Roger Roth, and Eric Hipke were improving and holding the west flank fireline. When the fire crossed the west drainage, Blanco and Mackey ordered the firefighters up the hill. Mackey proceeded from the lunch spot up the fireline to follow them. Kevin Erickson and Brad Haugh waited at the upper part of the fireline to encourage the crew coming up the hill. As the crew came into sight, Erickson saw a spot fire ignite below the crew near the bottom of the drainage. He immediately called a warning to Mackey on the radio.

At this point, all the firefighters were walking in a line carrying all their equipment. Haugh later reported, "It appeared to me that the crew was unaware of what was behind them, as they were walking at what I consid-

South Canyon Fire

ered a slow pace, tools still in hand, packs in place, and the sawyer still was shouldering his saw....There was a slight ridge behind the crew which obscured our view of the bottom of the fire. The fire roared behind the



Photo 8. Spot fire approaching ridgeline.

ridge, and that was the first indication of how bad it had gotten....The fire storm literally exploded behind the ridge with approximately 100-foot flame height. At this point I decided I had to run. I can't recall if anyone was ahead of me or not, nor can I recall what the crew's reaction was to the blowup. As I neared the crest of the ridge, the heat was intense. I topped out and headed down the other side about 150 feet. When I turned around, a wall of flame 150 feet tall and 1/4 of a mile wide was on the ridgetop and starting to roll down the east side of the ridge."

As the spot fire rapidly spread, Erickson and Haugh yelled for all to drop their equipment and run. Thrash, at the head of line, gave the word to



Photo 9. Fireline and fatality site.

deploy shelters. As the fire raced toward the crew, Erickson and Haugh, who were shouting encouragement, turned and ran for the ridgetop. They were quickly followed by Eric Hipke, who chose not to deploy his shelter but to make a run for it. As the three running firefighters dove over the ridgetop, 200-foot flames blasted over the ridge, and all three received burns. The last jumper over the ridge, Hipke, was knocked down by the force of heat and flames. Erickson and Haugh tended to Hipke's burns, and then all three followed the east drainage down to Interstate 70 and safety. Erickson guessed that the spot fire spread to the top of the ridge in a matter of 30 seconds.

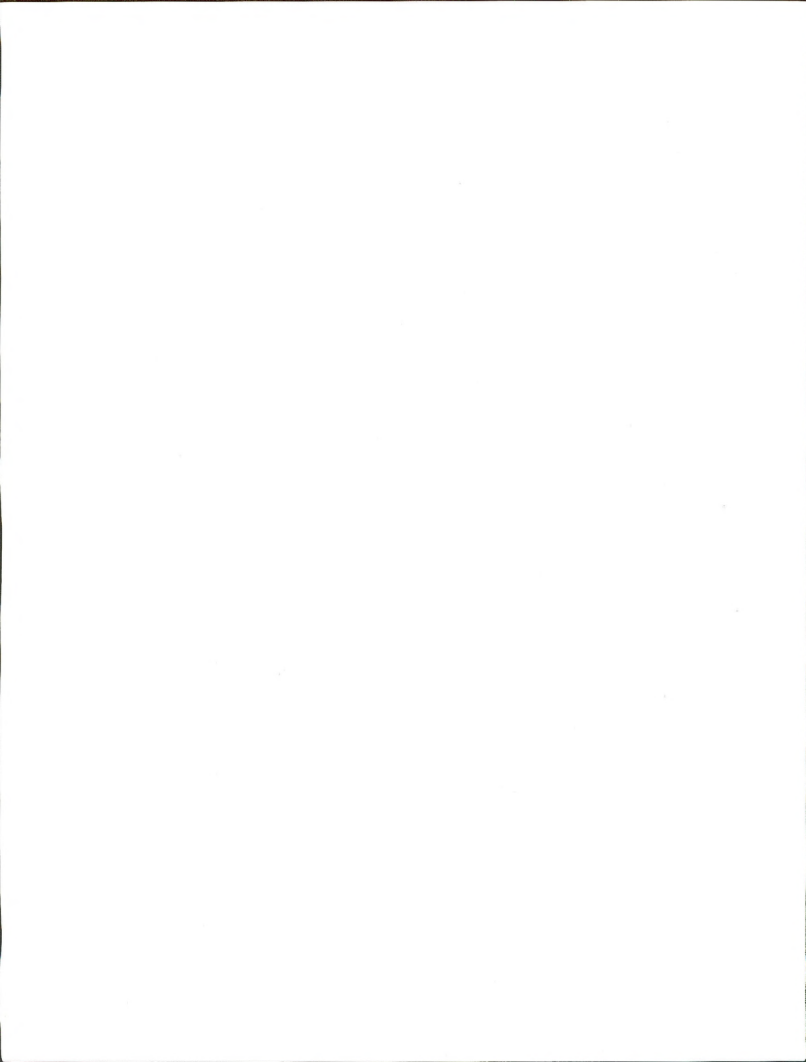
The fire overtook Mackey, Roth, Thrash, Kelso, Beck, Blecha, Brinkley, Holtby, Johnson, Bickett, Dunbar, and Hagen. They died just short of the ridgetop.

4. Helitack Crew

Helitack crew members Richard Tyler and Robert Browning had been directing helicopter operations from Helispot 2. As the fire threatened to crest the ridge, firefighters dropping into the east drainage shouted for Tyler and Browning to follow them into that drainage. But Tyler and Browning apparently did not believe the drainage was a safe escape route and chose to run along the top of the ridge above the jump site. The fire funnelled through the saddle at the jump site and cut off a route to the east. The slope to the northwest looked relatively flat with rock outcrops. The route appeared to be the best. Flanked by fire, Tyler and Browning headed in that direction. In 150-200 yards a steep rocky chute 50 feet deep blocked their escape. They tried to cross the chute but died when they were overcome by the fire in the chute.

As the fire blew up, helicopter pilot Dick Good dropped his water bucket at the helibase and returned to the fire to find the entire mountain in flame and smoke. He could not reach anyone.

The Grand Junction Fire Control Officer Winslow Robertson assumed responsibility for the South Canyon fire at 5 p.m. on July 6. He established an Incident Management Group of interagency fire people. This group managed the fire from 7 p.m. until midnight on July 6. At this time, a Type I Incident Management Team assumed control of the fire.



Investigation

As soon as it was known that firefighters had died on the South Canyon fire, an interagency accident investigation team was designated by the Director of the Bureau of Land Management and the Chief of the Forest Service. The team consisted of the following 10 members.

Les Rosenkrance, Leader, BLM
Mark Reimers, USFS
Roy A. Johnson, BLM
Jim Webb, USFS
John H. Graber, USFS (Union Rep.-NFFE)
Mike Clarkson, BLM
Paul Werth, National Weather Service
Sue Husari, USFS
Dick Mangan, USFS
Ted Putnam, USFS

The team was given full authority to use whatever other technical or support people that were necessary to complete the accident investigation and was directed to do the following:

1. Identify factual data associated with the circumstances relating to the incident.
2. Accurately and objectively record the findings of its investigation.
3. Analyze the findings to determine factors involved and their relationships.
4. As appropriate, recommend actions that should be immediately implemented to prevent similar future occurrences.
5. Develop and submit a factual report and an investigative report to the Director of the Bureau of Land Management and the Chief, U.S. Forest Service within 45 days of the accident.

The team first met on the evening of July 7 in Grand Junction, Colorado. Over the next 2 weeks, it investigated the fire and fatality sites and conducted a series of 70 interviews with witnesses. In addition, the team met regularly to discuss progress, clarify assignments, plan their report, and review their findings. On July 22, with the interviews completed and much of the investigation report drafted, the team adjourned with individual members continuing specific assignments. On August 9-11, the team reconvened to review a draft of the completed report in preparation for the report's publication and presentation to the Director of BLM and Chief of the Forest Service.

The team made every effort to complete its work within the specified 45 days to facilitate timely consideration of its findings by the Interagency Management Review Team. Some analysis of the entrapment response is

continuing. Should this or any other analysis result in any new findings, they will be given to the Management Review Team as a supplement to this report.

Findings

This section presents the South Canyon Fire Investigation Team's findings, which are supported by interviews, witness statements, physical evidence, Forest Service standard forms, and other information held in the investigation file in the Bureau of Land Management's Colorado State Office. The Investigation Team used the "Fire Entrapment Investigation and Review Guidelines," developed by the National Wildfire Coordinating Group (Appendix 12). Following these guidelines, the team assessed (and marked in parentheses) how categories of findings contributed to the accident: "significantly contributed," "influenced," or "did not contribute."

Fire Behavior

Fuels (significantly contributed)

- The primary fuel type burning on July 3, 4, and 5 was pinyon-juniper.
- Gambel oak was the predominant fuel consumed on July 6 in the rapid run culminating in the fatalities. Gambel oak was recognized as a highly flammable and hazardous fuel type in the accident report on the Battlement Creek fire (in the Grand Junction District within 30 miles of the South Canyon fire), which killed three firefighters in 1976.
- Live fuel moisture in the green Gambel oak was 125 percent.
- Live fuel moisture in the underburned Gambel oak was so low (60 percent) that it reacted much like dead fuel.
- Both annual and perennial grasses were completely cured.
- Gambel oak ranged from 6 to 12 feet high.
- The evacuation route and the successful deployments of fire shelters were in the pinyon-juniper fuel type. Unsuccessful deployments along the fireline were in the Gambel oak fuel type.
- The gullies and ravines in the fire area did not block the spread of fire.

Weather (significantly contributed)

- No weather observations were taken onsite.
- No spot weather forecasts were requested for the fire.
- Some firefighters knew a cold front was expected on July 6.
- The Investigation Team could find no one on the fire who knew of the red flag warning.
- The Incident Commander and some of the smokejumpers listened to NOAA Weather Radio, which continuously broadcasts weather information directed toward the public but does not broadcast fire weather forecasts or red flag warnings.
- The hotshot crew was informally told of an expected cold front with rain but was not given a weather briefing when arriving in Grand Junction.
- A fire weather meteorologist was assigned to the Western Slope Fire Coordination Center to give forecasts and briefings for specific wildfires. He was not, however, used on this fire.

- The Grand Junction District Dispatch Center briefed the Incident Commander on fire weather at 4:30 a.m. on July 6 but did not mention the red flag warning.
- A cold front moved into the fire area at around 3:20 p.m. on July 6. Winds dramatically increased and became very strong. At the time of the blowup, winds on the fire were estimated to be as high as 45 mph on the upper west slope near the fatalities.
- Fire weather forecasts were not being effectively communicated to fire-fighters on wildfires.
- A system was not in place to alert people on wildfires of significant weather changes. On July 6 between 12 noon and 1:00 p.m. winds in Grand Junction increased from 10 mph to 22 mph with gusts up to 30 mph.
- On July 5 and 6 the Haines Index was 6. The Haines Index correlates atmospheric conditions to large fire growth. The highest level of the Haines Index is 6, which shows a high potential for large fire growth.
- Ten red flag warnings were issued for the BLM Grand Junction District between June 1 and July 6, 1994.

Topography (significantly contributed)

- The fire area was very steep and rugged with 50 to 100 percent slopes.
- The terrain in the fire area is broken and rugged with gullies and ravines narrowing sharply at their bottoms.
- The fire was burning on all aspects. The major fire run resulting in the fatalities was on the northwest aspect.
- Elevations on the fire varied from 5,980 to 7,000 feet at the time of the blowup.

Predicted Versus Observed Fire Behavior (significantly contributed)

Predicted

- Extreme and hazardous fire behavior on the South Canyon fire could have been predicted for the passage of the cold front by using fire weather forecasts and information readily obtainable at the BLM Grand Junction District Office and the Western Slope Fire Coordination Center at 7:30 p.m. on July 5.
- The predicted spread and intensities are typical of fires that defy any direct control measures by handcrews, engines, dozers, or air support.
- In reevaluating proposed priorities, strategies, and tactics on the South Canyon fire, the Grand Junction District did not adequately consider forecast fire danger indices for July 6.
- The Weather Information Management System (WIMS) is difficult and time consuming to use.

Observed

- Fire behavior on July 3, 4, and 5 consisted of backing and flanking in the pinyon-juniper fuel type. The fire's main carrier was grass. The fire made short runs back up the hill and occasionally torched pinyon and juniper trees.
- The fire burned actively on the nights of July 4 and 5.
- The fire spread into the Gambel oak late on July 5 and spread through the leaf litter under the brush across and down slope at a rate of 70 feet per hour during the night and morning of July 6.
- A reburn southwest of Helispot 1 in mixed Douglas-fir pinyon-juniper at 3:45 p.m. on July 6 had 100-foot flame lengths.
- The fire crossed to the west side of the west drainage between 4:00 and 4:04 p.m. on July 6 and moved northwest at rates of 1.6 to 2.2 mph (140-195 feet per minute).
- Between 4:14 and 4:18 p.m. the fire spotted back to the east side of the west drainage below the firefighters hurrying up the fireline. Fire behavior intensified as the fire moved from the pinyon-juniper fuel type to the green Gambel oak to the underburned Gambel oak. The rate of spread also increased as the fire moved to a steeper slope with greater exposure to the wind.
- The spot fire grew quickly, accelerating from 3.1 mph (271 feet/minute) to 10.7 mph (941 feet/minute) as it approached the ridgeline. The fire moved from the bottom of the drainage to the ridgeline, covering 1,190 feet in 2 minutes.
- Five minutes after it crested the ridgeline, the fire in the west drainage reached the site of the helitack fatalities.

Indicators Of Drought (significantly contributed)

- Colorado's West Slope was in extreme drought as determined by the Palmer Drought Index. Glenwood Springs had had 8 straight months of below-normal precipitation, and precipitation since October 1993 had been 58 percent of normal.
- The burning index in early July was at the highest level ever recorded for those days in the 21 years of weather records at the Colorado National Monument.

Environmental Factors**Wind (significantly contributed)**

- Winds of up to 45 miles per hour at the time of the blowup caused difficulty in deploying fire shelters.

Smoke (influenced)

- Smoke was not a significant factor before the blowup.
- Heavy smoke during the blowup reduced visibility.

Temperature (influenced)

- Temperature in the fire area ranged from the upper 70s to lower 80s during the afternoon of July 6.

Terrain (significantly contributed)

- The fire area is very steep and rugged with slopes up to 55 percent on the fireline, making foot travel difficult.
- The soil in the fire area is thin, and the ground is covered with many rocks, ranging from pebbles to boulders.
- Throughout the fire area are gullies, ravines, and steep rock outcrops.

Visibility (significantly contributed)

- Firefighters could not see all of the active fire in the west drainage because of the height of the vegetation and the incised drainages that obscured the view to the bottom.

Incident Management

Objectives (significantly contributed)

Policy

- In the Glenwood Springs Resource Management Plan the South Canyon fire area is designated as a Fire Exclusion Zone, an area where all fires are to be fully suppressed. The objective for fire suppression in the Grand Junction District Fire Management Activity Plan for the Fire Exclusion Zone is to have 90 percent of fires controlled at 10 or fewer acres.
- On June 14, 1994, because of fire danger, BLM's Grand Junction District established a policy to suppress all new fires.

District Firefighting Resources

- The initial attack capability of the Grand Junction District consisted of two heavy engines and three light engines, with a total of 12 seasonal employees.
- All air support and additional fire fighting forces were requested from the Western Slope Fire Coordination Center.
- The Grand Junction District has averaged 150 fires per year over the past 5 years with a maximum of 10 new fires in a single day.

Fire Situation

- From June 25 through July 8, 1994, 264 new fires started in Colorado.
- Forty-four new fires were reported in the Grand Junction District in a 3-day period from July 3 through July 5.
- Six of these fires were given the highest priority on the basis of their rate of spread and their threat to gas wells, private land, residences, and a power transmission line along Interstate 70.

South Canyon Fire

- The South Canyon fire was ignited by lighting on July 2 and was reported to the BLM Grand Junction District on July 3 at 11:00 a.m.
- The Grand Junction District Dispatch Center's belief that the fire might be on private land complicated early actions.
- The legal description of the fire site was accurate in the initial fire report (July 3 at 11:00 a.m.), placing the fire on BLM-administered public lands.
- The fire was assigned a low priority for initial suppression because of multiple fires throughout Colorado, reported light fuels on the site, the fire's small size, and safety concerns.
- Initially the fire was not viewed as a threat to residential structures, but as it spread, it became apparent that if left unabated, it could potentially become a threat.
- Starting the night of July 3, initial attack forces were informally requested to attack the South Canyon fire.
- Initial attack occurred the morning of July 5.
- Reinforcements arrived the night of July 5.
- The Incident Commander was concerned that firefighting activities would dislodge rocks and debris and cause safety problems on Interstate 70.
- Concerns for threats to residential structures in Glenwood Springs and other communities influenced decisions and actions on the fire.
- The fire's priority was increased by mounting public pressure for action, the increased intensity of the fire, and improved resource availability. Fireline construction began on July 5.
- The fire was not considered to have escaped initial attack until 4:30 p.m. on July 6.

Strategy (significantly contributed)

- The strategy was to control the fire using direct attack, starting from the top of the fire.

Tactics (significantly contributed)

- On July 5 the Incident Commander and six BLM/Forest Service firefighters hiked to the top of the fire, started building Helispot 1, and began a direct attack.
- Early on July 6 an order for a fixed-wing aerial observer was filled with Helicopter 93R, which was used for multiple purposes all day.
- On July 6 the Incident Commander and the Jumper in Charge flew the fire in Helicopter 93R and agreed to continue direct attack down the fire's west flank.
- During the day of July 6 Helicopter 93R was used for shuttling firefighters and gear and for bucket drops, limiting the aircraft's effectiveness for aerial observation. Regulations prohibit agency people from riding in helicopters during sling load and bucket operations and thus prevent an onboard observer from being on such flights.

- The Prineville Interagency Hotshot Crew was split into two groups to work both the ridge and the west flank firelines.
- The map drawn during the July 6 morning aerial reconnaissance did not include the fingers of fire in the lower west drainage.
- Strategy and tactics were not adjusted when Type I crews and air support failed to arrive in time on July 5 and 6.
- Tactics were not adjusted in anticipation of a passing cold front.

Safety Briefings And Major Concerns (significantly contributed)

- On July 5 and 6 some firefighters expressed safety concerns about fire tactics and fire behavior.
- Fire weather and red flag warnings were not broadcast over fire radio frequencies, nor were they given to firefighters on the fire.
- The Incident Commander and the smokejumpers programmed their fire radios to receive the NOAA weather broadcast frequency for general weather information. But such information is not oriented toward firefighting.
- During a July 6 reconnaissance of the fire, the Jumper in Charge was asked by smokejumpers on the ground where the safety zones in the west drainage were. He replied that there were not any safe areas but there were some sparse areas below.
- Before the blowup on July 6 several smokejumpers discussed the number of 10 Standard Fire Orders and 18 Watch Out Situations that were being compromised.
- Some but not all of the firefighters building and holding the fireline on the ridge knew that Helispot 1 was a safety zone.
- No lookouts were posted.
- Some firefighters were not briefed on escape routes and safety zones. Lacking this knowledge, some of these firefighters chose their own.
- Reports on the fire during its early stages were contradictory. Some reported light fuels with little potential for spread. Others reported high potential for rapid spread with extremely high risk for firefighters.
- The smokejumpers had their jump gear moved from the fire on the morning of July 6 because they expected that the entire drainage might burn.

Instructions Given (significantly contributed)

- Not all firefighters were aware of the suppression plans for July 6.
- The Investigation Team has not been able to find that any of the firefighters received a briefing that included information about a red flag warning.
- The second load of smokejumpers were briefed in Grand Junction about predicted high winds.
- No organized briefing or discussion was held on local fuel types or expected fire behavior.

- The Prineville Interagency Hotshot Crew did not receive any briefings from the time it arrived in Grand Junction.

Control Mechanisms

Span Of Control (did not contribute)

- The Western Slope Fire Coordination Center and the Grand Junction District Dispatch Center expressed a concern for safety of ground and aviation people because of extremely heavy radio traffic on the Grand Junction District frequency.
- Enough supervisors were on the fire to effectively supervise the firefighters.

Radio And Telephone Communications (did not contribute)

- All crews had good radio coverage: one radio for two smokejumpers, one radio for three hotshots, and one radio for three BLM/Forest Service firefighters.
- Firefighters could talk to the Grand Junction District Dispatch Center.
- Ground-to-air communications were good.
- The Incident Commander had good cellular telephone communication with Grand Junction District Dispatch and the Glenwood Springs Fire Department.

Ongoing Evaluations (significantly contributed)

- On July 6 at 9:45 a.m. the Incident Commander and the Jumper in Charge flew the fire in Helicopter 93R, prepared a fire map, and agreed to start a direct attack down the fire's west flank.
- The Incident Commander, Jumper in Charge, and Hotshot Superintendent continued to evaluate fire behavior from the ground but did not adjust strategy and tactics in response to the intensifying fire behavior on July 6.
- Because of higher winds and fire spotting, at about 2:30 p.m. the BLM/Forest Service ground crew and the hotshots started patrolling the ridge for spot fires.

Involved Personnel Profiles

Training/Qualifications/Physical Fitness (did not contribute)

- Firefighters were qualified for the positions they held on the fire.
- Contrary to Forest Service regional policy, some Region 1 smokejumpers had not received refresher fire shelter training.

Operational Period Length/Fatigue (influenced)

- Before July 6, shifts exceeding 12 hours were common for most of the firefighters.

- The Western Slope Fire Coordination Center's helitack crew had worked 26 consecutive days without a day off, with most shifts in that period exceeding 12 hours.

Attitudes (significantly contributed)

- Some firefighters questioned the effectiveness of fire shelters in the fuel type and terrain of the South Canyon fire.
- Some firefighters failed to recognize the capability and limitations of fire shelters and deployment sites.
- Some firefighters questioned the value of fire shelters under any conditions and may not have been carrying shelters.
- Red flag warnings were not given enough importance by the helicopter pilot and the District Fire Management Officer because of the number of such warnings over the recent period.
- People in the Grand Junction District Dispatch Center expressed the belief that most pinyon-juniper fires do not exceed 100 acres in this area.
- The "can do" attitude of the smokejumpers and hotshots compromised the 10 Standard Firefighting Orders and the 18 Watch Out Situations.
- Despite the fact that they recognized that the situation was dangerous, the firefighters who had concerns about building the west flank fireline questioned the Jumper in Charge, but then chose to continue with construction.
- No evidence was found that fire shelters encouraged tactical risk taking.

Leadership (significantly contributed)

- The Incident Commander returned to Glenwood Springs from 5:30 p.m. on July 5 to 8:45 a.m. on July 6 to prepare for the next day. The Jumper in Charge assumed the role of Incident Commander during that period.
- Some firefighters were confused about who was making the decisions on strategy and tactics.
- Command and supervisory firefighters did not use all the expertise they had at hand in predicting potential fire behavior and its relationship to tactics.
- A squad leader and the Jumper in Charge discussed whether they should be building the fireline downhill toward the fire because of concern expressed by smokejumpers about the location of the west flank fireline.
- A squad leader and the Jumper in Charge discussed who should be in charge as conditions worsened.
- Several firefighters played heroic roles during the blowup and escape.

Equipment

Availability (did not contribute)

Personal Protective Equipment

- Except where noted, firefighters were wearing required personal protective equipment, including gloves, boots, hardhats, and aramid (Nomex) shirts and jeans. Sawyers were wearing chainsaw chaps.
- A firefighter who received radiant heat burns on his hands had gloves but was not wearing them.

Fire Shelters

- One or more surviving firefighters may not have brought fire shelters to this fire although they could have obtained them.
- All firefighters who perished were carrying fire shelters.

Performance (influenced)

Personal Protective Equipment

- Although 14 firefighters were overcome by the fire, all personal protective equipment performed within design limitations.
- Three surviving firefighters received radiant heat burns through their clothing and to exposed skin.
- Because of a broken cinch strap on his glove, one surviving firefighter had to remove his glove to deploy his fire shelter.
- The firefighters who perished did not drop their tools or packs while trying to escape. Dropping their tools or packs would have significantly increased their chance of escape.
- When two firefighters began to deploy their fire shelters, most of the west flank firefighters also stopped to deploy their shelters.
- Two flanking line firefighters and two firefighters who had come down from the top ran up the hill from the deployment site. Three of these four firefighters arrived at the top of the hill and survived. The fourth perished close to the top.

Fire Shelters

- Eight firefighters successfully deployed their fire shelters without burns or smoke inhalation.
- One smokejumper survived the entrapment without deploying a fire shelter and did not receive burns or suffer smoke inhalation.
- Twelve firefighters who perished did not have enough time to open their shelters and get under them.
- The two fully deployed fire shelters lay perpendicular to the fire direction, compromising their effectiveness.
- One firefighter deployed a fire shelter over one or two packs with fusees that ignited.
- Two firefighters who fully deployed their fire shelters died of smoke inhalation and heat.

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- Fire shelters were difficult to remove when suspended vertically under packsacks.
- Firefighters could remove their fire shelters with one hand when their shelters were mounted horizontally on their belts or mounted vertically on side locations.

The 10 Standard Fire Orders And 18 Watch Out Situations

Wildland firefighting is a tough, arduous, and often high-risk job. Much effort has been spent to reduce that risk and improve fire safety and eliminate firefighter fatalities. Personal protective equipment (Nomex clothing, fire shelters), and improved communications and fire behavior prediction technology are but a few of the changes that have improved the firefighter's safety margin. Nevertheless, accidents still occur.

What we have learned from investigating wildland fires is that time and time again fatalities can be attributed to one or more violations of the 10 Standard Fire Orders, which were developed in 1957 by a taskforce studying ways to prevent firefighting fatalities.

Shortly after the Standard Fire Orders were incorporated into firefighter training, the 13 Situations That Shout Watch Out were developed. As a result of other accidents, the 13 were expanded to 18 Watch Out Situations. These 18 situations are more specific and cautionary than the Standard Fire Orders and describe situations that expand the 10 points of the Fire Orders. If firefighters follow the 10 Standard Fire Orders and are alerted to the 18 Watch Out Situations, much of the risk of firefighting can be reduced.

The 10 Standard Firefighting Orders and 18 Watch Out Situations were designed to help firefighters recognize and mitigate firefighting risks. They also provide a ready checklist for periodic review as fire action progresses. Every wildland firefighter is instructed in their meaning and application.

- Firefighters who successfully deployed their fire shelters reported difficulty deploying them on steep terrain with high winds.
- Firefighters on the ridgetop failed to recognize areas where fire shelters could have been successfully deployed.
- The location where the firefighter highest up the hill died would have been survivable in a fire shelter.

10 Standard Fire Orders (significantly contributed)

1. Fight fire aggressively but provide for safety first.
 - The tactics as implemented provided for aggressive suppression but overlooked many critical safety factors.
2. Initiate all action in response to current and expected fire behavior.
 - Aggressive attack continued in spite of onsite indicators of extreme fire behavior and increasingly stronger winds.
 - Most firefighters were unaware of or disregarded how intensely

Gambel oak and pinyon-juniper fuel types burn during extremely dry and windy conditions.

3. Recognize current weather conditions and obtain forecasts.
 - No spot weather forecasts were requested by fire personnel.
 - No onsite weather observations were taken.
 - The Investigation Team could find no one on the fire who knew of the red flag warning predicted to accompany the cold front.
4. Ensure that instructions are given and understood.
 - Instructions appeared to be fairly straight forward.
5. Obtain current information on fire status.
 - No one on the fire had a complete picture of the fire's activity and status.
6. Remain in communication with crew members, your supervisor, and adjoining forces.
 - Radio communications were good.
7. Determine safety zones and escape routes.
 - Most of the firefighters did not have clear instructions on safety zones and escape routes.
8. Establish lookouts in potentially hazardous situations.
 - No one could see the part of the fire that presented the most hazard.
9. Retain control at all times.
 - During the first phases of the fire, supervisors effectively controlled the firefighters.
 - Supervisory control was generally effective given the blowup conditions.
10. Stay alert, keep calm, think clearly, act decisively.
 - The firefighters were alert, but they failed to adjust strategy and tactics in a timely manner.
 - The firefighters remained calm during the events leading to the blowup.
 - Failure to recognize the indicators of blowup conditions led to the entrapment of the firefighters.
 - Decisive action resulted in the escape of 35 firefighters when the fire blew up.

18 Watch Out Situations (significantly contributed)

1. Fire not scouted and sized up.
 - The Incident Commander and the Jumper in Charge conducted a helicopter reconnaissance of the fire at 9:45 a.m. on July 6. Firefighters on foot also scouted portions of the fire.
 - During the sizeup hazards were not adequately recognized. The map drawn on the reconnaissance flight did not show the fingers on the fire's northwest edge.
2. Country not seen during the daylight.
 - Not a factor.
3. Safety zones and escape routes not identified.

- Most of the firefighters did not have clear instructions on safety zones and escape routes.
4. Unfamiliar with local weather and local factors influencing fire behavior.
 - The firefighters were unaware of the red flag warning predicted for the afternoon of July 6.
 - Most of the firefighters were unaware of or disregarded how intensely Gambel oak and pinyon-juniper fuel types burn during extremely dry and windy conditions.
 5. Uniformed on strategy, tactics, and hazards.
 - Many of the firefighters were unclear or not fully informed on hazards.
 6. Instructions and assignments not clear.
 - Instructions appeared to be straight forward.
 7. No communications link with crew members and supervisors.
 - Radio communications were good.
 8. Constructing fireline without a safe anchor point.
 - The fireline was not secured to a safe anchor point.
 9. Building fireline downhill with fire below.
 - The west flank of the fireline was being built downhill along the edge of the fire following the burned surface fuels.
 - The fire extended farther down the canyon, below and out of sight of the crew.
 - Most of the guidelines for reducing the hazards of downhill line construction in the Fireline Handbook (PMS 410-1) were not followed. These guidelines are listed in Causal Factors.
 10. Attempting frontal assault on fire.
 - Not a factor. The fire had no distinct head.
 11. Unburned fuel between you and the fire.
 - A significant area of unburned aerial fuels lay between the firefighters and the fire.
 - Firefighters were following the burned surface fuels but did not adequately consider the reburn potential of Gambel oak.
 12. Cannot see main fire and are not in contact with anyone who can.
 - No one could see the part of the fire that presented the greatest hazard.
 - Terrain and vegetation blocked many firefighters' view of the main fire.
 - A lookout who could continually view the main fire was not posted.
 13. You are on a hillside where rolling material can ignite fuels below.
 - The west flank fireline was on a steep hillside where rolling material could and did ignite fires below the line.
 14. Weather is getting hotter and dryer.
 - Before the blowup on July 6 the weather was hot and dry.
 15. Wind increases or changes direction.
 - Before the blowup on July 6 the wind velocity increased significantly.
 16. Spot fires frequently cross line.

- During suppression on July 5 and 6 firefighters encountered some problems with spot fires.
- 17. Terrain and fuels make escape to safety zones difficult.
 - The steep terrain and dense Gambel oak made escape to safety zones extremely difficult.
- 18. Taking a nap near the fireline.
 - Not a factor on this fire.

Management Support And Dispatch Coordination

Management Support (Influenced)

- In the Glenwood Springs Resource Management Plan the South Canyon fire area is designated as a Fire Exclusion Zone, an area where all fires are to be fully suppressed. The objective for fire suppression in the Grand Junction District Fire Management Activity Plan is to have 90 percent of the fires controlled at 10 or fewer acres.
- The District Management Team on June 14, 1994, issued the following direction to clarify what appropriate suppression would be based on severe conditions: "We will not monitor fires, but suppress them."
- On July 5, 1994, the Grand Junction District Manager also clarified the priority for suppression: "Due to the prolonged fire danger and fire incidents, it is necessary that all personnel be available to support fire suppression action when called upon by Grand Junction Dispatch."
- Smaller budgets and lower personnel ceilings have reduced the Grand Junction District and Western Slope Fire Coordination Center's firefighting capability.
- In some cases employees have been placed in management positions without the technical expertise to manage the programs they head.

Dispatch Coordination (Grand Junction District and Western Slope Fire Coordination Center) (Influenced)

- District Dispatch procedures were not adequate.
- Fire weather, fire danger, and predicted fire behavior information was not being adequately developed, interpreted or communicated to ongoing fires.
- Dispatch records at the District and Western Slope Fire Coordination Center were not being adequately maintained to permit analysis of how resource orders are placed and filled.
- District and the Western Slope Fire Coordination Center lacked an understanding or acceptance of their relative roles and responsibilities, particularly, in setting priorities and allocating resources.
- Part of the District fire orders for the South Canyon fire were made as informal requests by telephone or in person to individuals in the Western Slope Fire Coordination Center. No records of these informal orders were maintained.

South Canyon Fire

- Lack of documentation of resource needs resulted in inadequate followup by the District or Western Slope Fire Coordination Center to acquire appropriate resources through Regional or National logistics centers. Apparently, there were intermittent opportunities where additional air support was available on July 3, 4, and 5, but they were not used on the South Canyon fire.

Causal Factors

Direct Causes

The Investigation Team determined that the direct causes of the entrapment in the South Canyon fire are as follows.

Fire Behavior

Fuels

- Fuels were extremely dry and susceptible to rapid and explosive spread.
- The potential for extreme fire behavior and reburn in Gambel oak was not recognized on the South Canyon fire.

Weather

- A cold front, with winds of up to 45 mph, passed through the fire area on the afternoon of July 6.

Topography

- The steep topography, with slopes from 50 to 100 percent, magnified the fire behavior effects of fuel and weather.

Predicted Behavior

- The fire behavior on July 6 could have been predicted on the basis of fuels, weather, and topography, but fire behavior information was not requested or provided. Therefore critical information was not available for developing strategy and tactics.

Observed Behavior

- A major blowup did occur on July 6 beginning at 4:00 p.m. Maximum rates of spread of 18 mph and flames as high as 200 to 300 feet made escape by firefighters extremely difficult.

Incident Management

Strategy and Tactics

- Escape routes and safety zones were inadequate for the burning conditions that prevailed. The building of the west flank downhill fireline was hazardous. Most of the guidelines for reducing the hazards of downhill line construction in the Fireline Handbook (PMS 410-01) (see box on next page) were not followed.
- Strategy and tactics were not adjusted to compensate for observed and potential extreme fire behavior. Tactics were also not adjusted when Type I crews and air support did not arrive on time on July 5 and 6.

Safety Briefing and Major Concerns

- Given the potential fire behavior, the escape route along the west flank fireline was too long and too steep.

Downhill/Indirect Line Construction Guidelines

Downhill/Indirect line construction in steep terrain and fast burning fuels should be done with extreme caution. Direct attack methods should be used whenever possible. The following guidelines should be followed.

- The decision is made by a competent firefighter after thorough scouting.
- Downhill line construction should not be attempted when fire is present directly below the proposed starting point.
- The fireline should not be in or adjacent to a chimney or chute that could burn out while a crew is in the vicinity.
- Communication is established between the crew working downhill and crews working toward them from below. When neither crew can adequately observe the fire, communications will be established between the crews, supervising overhead, and a

lookout posted where the fire's behavior can be continuously observed.

- The crew will be able to rapidly reach a zone of safety from any point along the line if the fire unexpectedly crosses below them.
- A downhill line should be securely anchored at the top. Avoid underslung line if at all practical.
- Line firing should be done as the line progresses, beginning from the anchor point at the top. The burned out area provides a continuous safety zone for the crew and reduces the likelihood of fire crossing the line.
- Be aware of and avoid the "18 situations that shout watch out!"
- Full compliance with "the 10 standard fire orders" is assured.

From Fireline Handbook, PMS 410-01,
National Wildfire Coordinating Group,
NFES 0065.

- Eight of the 10 Standard Firefighting Orders were compromised.
- Twelve of the 18 Watch Out Situations were not recognized, or proper action was not taken.
- The Prineville Interagency Hotshot Crew (an out-of-state crew) was not briefed on local conditions, fuels, or fire weather forecasts before being sent to the South Canyon fire.

Involved Personnel Profile

- The "can do" attitude of supervisors and firefighters led to a compromising of Standard Firefighting Orders and a lack of recognition of the 18 Watch Out Situations.
- Despite the fact that they recognized that the situation was dangerous, firefighters who had concerns about building the west flank fireline questioned the strategy and tactics but chose to continue with line construction.

Equipment

- Personal protective equipment performed within design limitations, but wind turbulence and the intensity and rapid advance of the fire exceeded these limitations or prevented effective deployment of fire shelters.

- Packs with fuses taken into a fire shelter compromised the occupant's safety.
- Carrying tools and packs significantly slowed escape efforts.

Contributory Causes

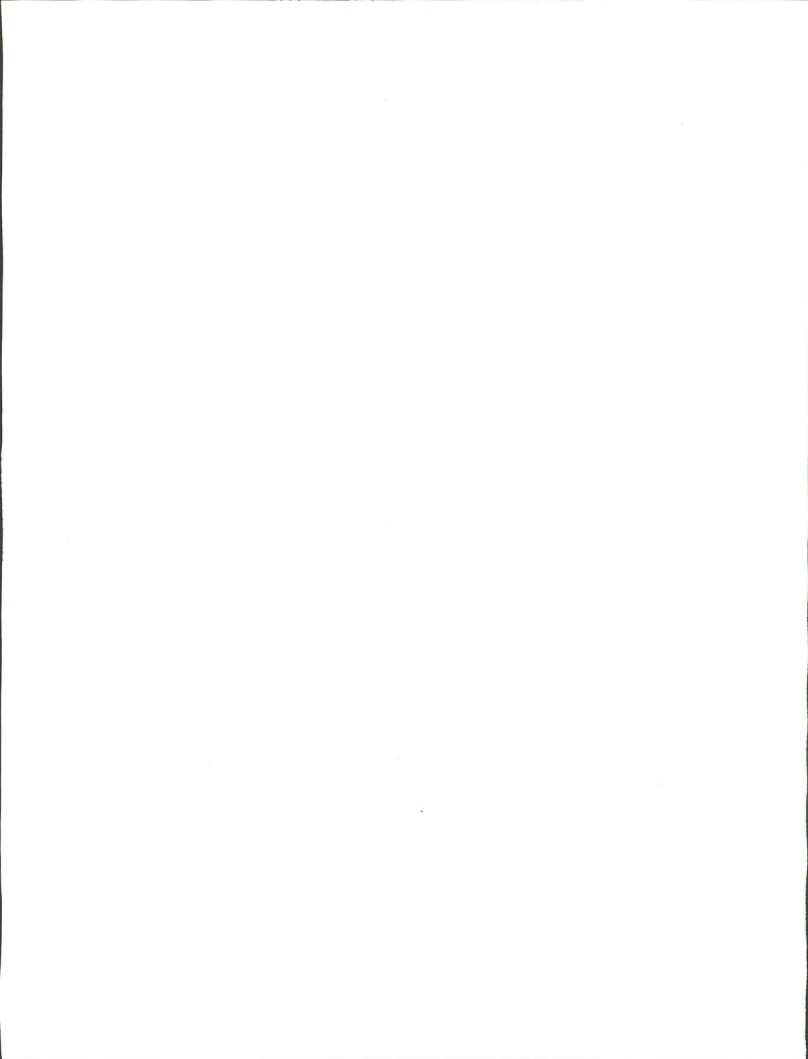
The following factors contributed to the entrapment on the South Canyon fire.

Incident Management and Control Mechanisms

- The initial suppression action was delayed for 2 days because of higher priority fires on the Grand Junction District.
- Air support was inadequate for implementing strategies and tactics on July 6.

Support Structure

- The above-normal fire activity overtaxed a relatively small firefighting organization at the Grand Junction District and Western Slope Fire Coordination Center.
- Detailed fire weather and fire behavior information was not given to firefighters on the South Canyon fire.
- Dispatching procedures and communications with the Incident Commander did not give a clear understanding of what resources (crews and air support) would be provided to the fire in response to requests and orders.
- Unclear operating procedures between the Western Slope Fire Coordination Center and the Grand Junction District's fire organizations resulted in confusion about priority setting, operating procedures, and availability of firefighting resources, including initial attack resources (i.e. helitack firefighters, smokejumpers, and retardant aircraft). This lack of definition limited the effectiveness in the timing and priority of the suppression of the South Canyon fire.
- The lack of Grand Junction District and Colorado State Office management oversight, technical guidance, and direction resulted in uncertainty concerning the roles and responsibilities of the Western Slope Fire Coordination Center and the Grand Junction District.

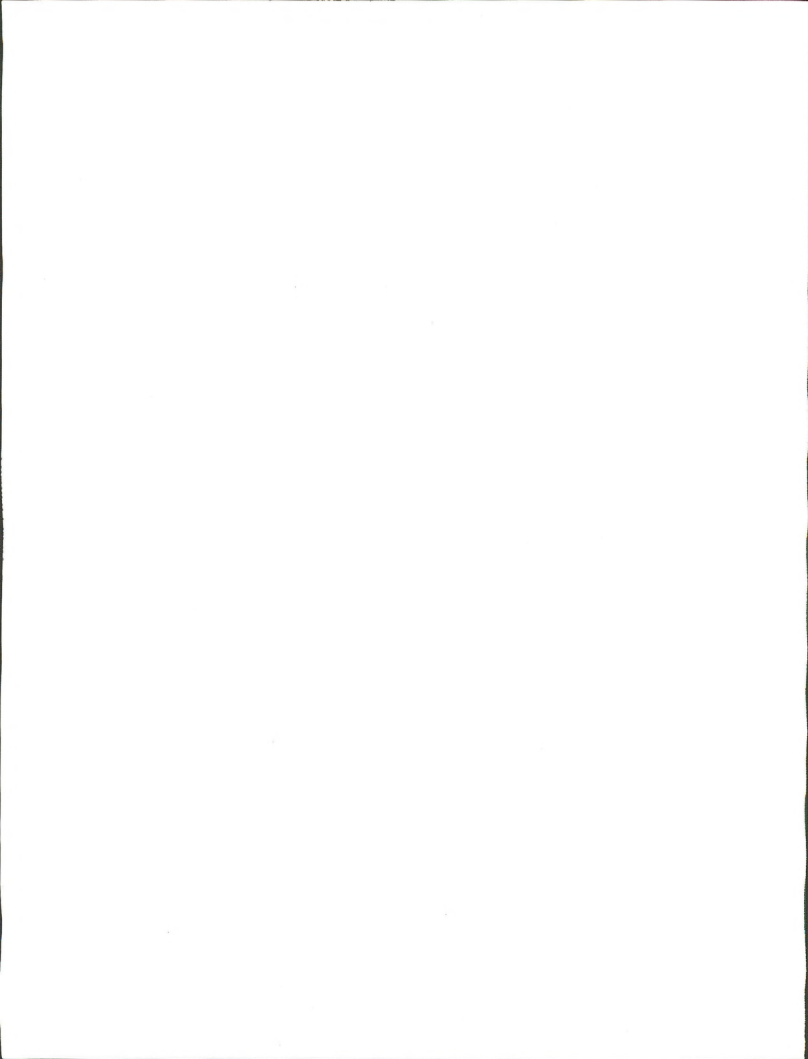


Followup Actions

This report was presented to the Director of the Bureau of Land Management and the Chief of the Forest Service on August 17, 1994. The Director and the Chief have established an Interagency Management Review Team that will review the Investigation Team's accident reports and to develop proposed corrective actions that should be implemented by the agencies to reduce future accidents of this nature.



Appendixes



Appendix 1 — Weather

Prior Conditions

Persistent high pressure resulted in low snowpacks and deficient precipitation throughout the western United States during the winter and spring of 1994. As a result, western Colorado was in extreme drought as shown on the July 9 Palmer Drought Index map (Chart W-1).

Listed below is the precipitation in inches compared to normal at Glenwood Springs between October 1993 and June 1994.

Inches	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Actual	2.00	.67	.39	.25	1.23	.38	1.55	.39	.77
Normal	1.57	1.21	1.46	1.60	1.45	1.47	1.73	1.49	1.22
Dep.*	.43	-.54	-1.07	-1.35	-.22	-1.09	-.18	-1.10	-.45

*departure from normal

Glenwood Springs has had below normal precipitation for 8 months in a row. Since October 1993, only 58 percent of normal precipitation has fallen.

In addition to having below normal rainfall, May and June were much warmer than normal. Grand Junction recorded its second hottest June on record, averaging 5.4 degrees above normal.

Colorado Vicinity Map

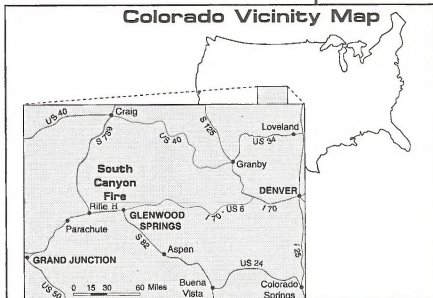


Chart W-1: Palmer Drought Map, July 6, 1994

Hot, dry weather continued into July. The South Canyon fire ignited on July 2 when dry lightning storms moved through western Colorado.

Tuesday July 5, 1994

On July 5 weak high pressure aloft and a hot, dry airmass covered western Colorado. The upper winds, measured over Grand Junction, were light southwesterly through 14,000 feet, and then increased to 30 miles per hour (mph) at 16,000 ft. Strong surface heating destabilized the lower levels of the atmosphere during the afternoon, but the air remained too dry

South Canyon Fire

for thunderstorms to develop. The BLM Automatic Lightning Detection System (ALDS) detected no lightning strikes on the West Slope.

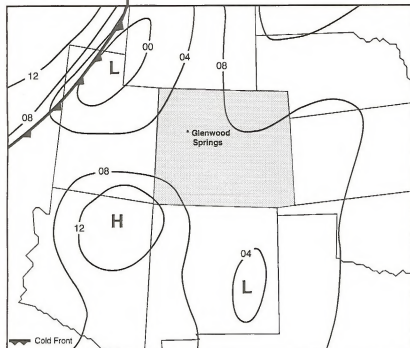


Chart W-2: 1800 MDT Surface Weather Map
July 5, 1994

During the morning, a strong cold front developed in western Idaho. This front was associated with an unseasonably cold upper level low pressure system, centered over northern Oregon. At 1800 hours, the cold front had moved into eastern Idaho and extended southwestward into central Nevada (Chart W-2). The upper level low was now centered near Boise, Idaho (Chart W-3). Hot, dry and windy weather covered southern Wyoming and all of Utah ahead of the front. Much cooler temperatures and scattered showers spread across Idaho behind the cold front. A band of strong winds, 30 to 40 mph at 10,000 feet blew over western Utah and Nevada.

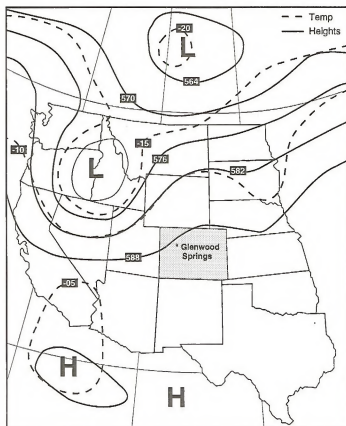


Chart W-3: 500MB Analysis Heights/
Temp 1800 MDT Tuesday, July 5, 1994

No weather observations were recorded at the fire, but the nearby Rifle RAWS (Remote Automatic Weather Station) at about the same elevation recorded a high temperature of 91 degrees and a minimum relative humidity of 10 percent (Table W-1). Winds blew light and variably most of the day but became southerly 10 to 15 mph with gusts up to 20 mph during the evening. These evening winds signaled the approaching cold front.

In anticipation of strong cold front winds Wednesday afternoon, July 6, a red flag warning was issued for northwest Colorado at 1920 hours (Exhibits W-1 and W-2).

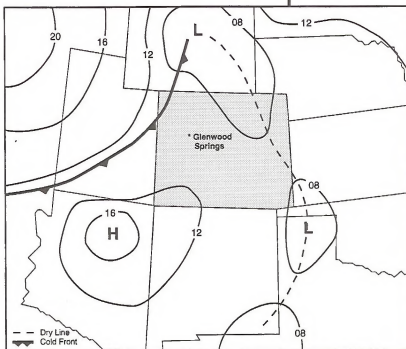


Chart W-4: 0600 MDT Surface Weather Map July 6, 1994

Wednesday July 6, 1994

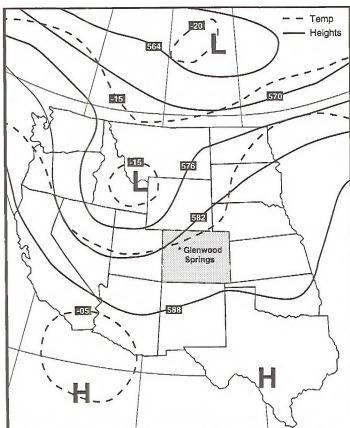


Chart W-5: 500MB Analysis Heights/Temp 0600 MDT Wednesday, July 6, 1994

At daybreak on Wednesday, the cold front extended across central Wyoming, northwest Colorado (near Dinosaur National Monument), and southwest Utah (Chart W-4). The associated upper level low pressure system was centered a little west of Yellowstone National Park with a trough extending southward into northern Utah (Chart W-5).

South Canyon Fire

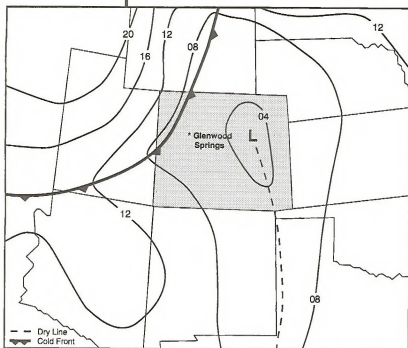


Chart W-6: 1200 MDT Surface Weather Map
July 6, 1994

The cold front continued to move south and east during the morning, reaching Grand Junction at 1300 hours (Chart W-6). As the cold front passed, winds over Grand Junction grew strong and gusty, increasing from 10-15 mph to 25-35 mph (Table W-2). The cold front advanced up Grand Valley passing Rifle RAWS at about 1400 hours. Winds increased to 25-30 mph with gusts exceeding 40 mph (Table W-1). No weather observations were taken on the South Canyon fire, but interviews revealed that the cold front crossed the fire site around 1520 hours. Wind intensity significantly increased and became very strong by 1600 hours. Estimated winds on the fire, according to the Rifle RAWS (modified for terrain),

varied from 20-35 mph in the canyon on the west side of the fire to 45 mph on the ridgetop. Wind gusts, exceeding 50 mph, were likely in the chimneys and saddles near the ridgetop. The cold front rapidly moved east into the Denver area at around 1800 hours (Chart W-7). Winds on the fire remained very strong until 2000 hours and then began to diminish.

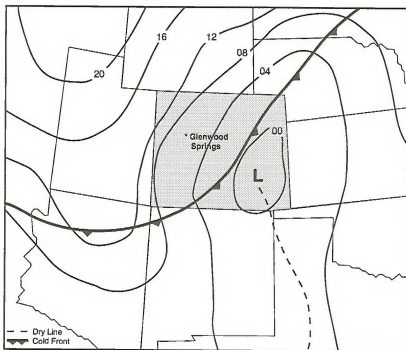


Chart W-7: 1800 MDT Surface Weather Map
July 6, 1994

The upper level low moved across northwest Wyoming during the day and by evening was centered near Sheridan. A trough extended from the low across southwest Wyoming and eastern Utah. The band of strong winds aloft traversed northern Utah and northwest Colorado.

An unstable airmass developed over western Colorado, but limited moisture allowed only towering cumulus clouds to form over the fire site (Chart W-9). A few lightning strikes were detected by the BLM's Lightning Detection System (ALDS) well south and east of the site. At the time of the blowup, the cumulus clouds had moved to the east, and skies were clearing from the west. Clearing skies and the strong winds were visual indicators that a cold front had crossed the site.

Temperatures dropped a few degrees from Tuesday's readings, but relative humidities remained extremely low. The Rifle RAWS reported a high temperature of 84 degrees and a minimum relative humidity of 8 percent.

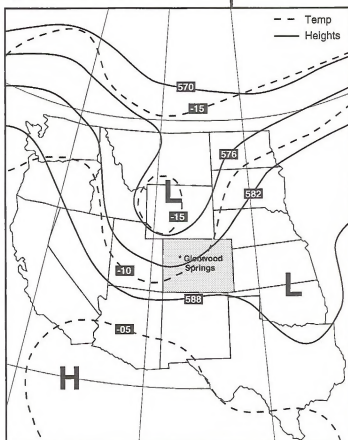
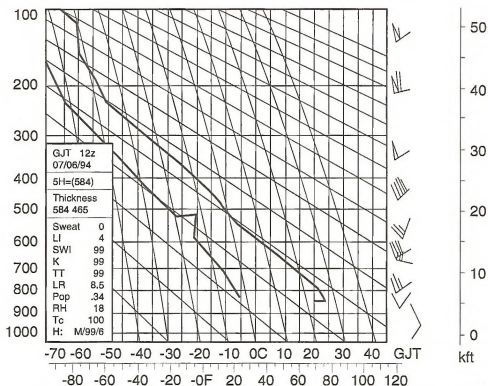


Chart W-8: 500 MB Analysis Heights/
Temp 1800 MDT Wednesday, July 6,
1994

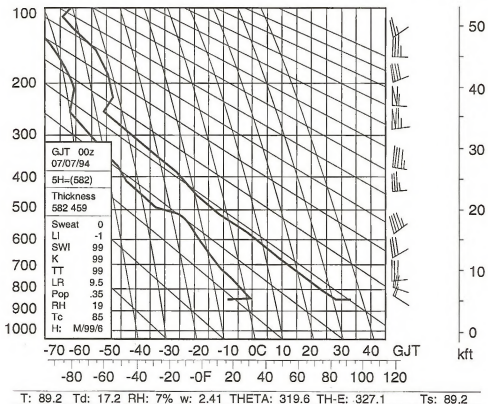
Haines Index

As a tool to measure the contribution of atmospheric stability to the growth potential of existing wildfires, the Haines Index (Haines 1988) combines two key atmospheric factors known to significantly influence the growth of wildfires: moisture and stability. Low moisture (relative humidity) adds to the combusive energy of wildfires by lowering the moisture content of fine dead fuels. Unstable air promotes vertical motion in the convective column. The Haines Index at the South Canyon fire was determined by using the upper air sounding at Grand Junction. The high-elevation Haines Index was calculated to be 6 on both July 5 and 6. On the basis of atmospheric conditions over the fire, a Haines Index value of 6 correlates to a high potential for large fire growth. The combination of strong cold-front winds and a 6 Haines Index contributed to the blowup on the afternoon of July 6.

6:00 A.M. Grand Junction Upper Air Sounding



6:00 P.M. Grand Junction Upper Air Sounding



Area Weather Outlook 1920, Tuesday, July 5

This weather outlook applies to northwestern Colorado ... including fire weather zones 201 ... 202 ... 205 ... 206 ... and zone 207 west of Aspen.

... The cold front will arrive earlier about 8 hours sooner than expected ...

*** Red Flag Warning Wednesday ***

Weather Discussion: A cold front over southeast Idaho will move into the Dinosaur N.P. area about 0900 Wednesday ... and then through Craig before 1100. The front should reach Grand Junction about 1400-1500 ... then move through Paonia and Montrose about the same time ... around 1700. This is more than 8 hours faster than previously forecast.

Craig District: Increasing clouds late tonight. Mostly cloudy Wednesday morning and afternoon with scattered showers and thunderstorms. The chance of rain: 40 percent. Southwest winds 15-30 mph, shifting to northwest 15-25 mph between 0900 and 1100. Wind gusts of 30-40 mph with frontal passage. High temps: 72-80. Low RH: 20-28%.

Grand Junction District: Increasing high clouds in the morning, with southwest winds of 10-20 mph by 1100. Winds increasing to 15-30 mph by 1300. About 1500, surface winds will shift to the northwest at 15-25 mph. Wind gusts of 30-35 mph with frontal passage. Skies will become mostly cloudy in the afternoon with a 30% chance of showers and thunderstorms in the late afternoon. High temps: 80-87. Low RH: 15-25%.

Montrose District: Increasing high clouds in the morning. By 1100 expect southwest winds of 10-20 mph. Surface winds will increase to 15-30 mph by 1400, then shift to the northwest at 15-25 mph about 1700. Wind gusts of 30-35 mph possible with frontal passage. Becoming mostly cloudy late in the afternoon, with a 20 percent chance of showers and thunderstorms. High temps: 80-87. Low RH: 15-25%.

Exhibit W-1

Rifle, Colorado RAWS Weather Data Elevation 6120 Feet

Tuesday, July 5, 1994					
Hour (MDT)	Temp (deg)	Relative Humidity (%)	Wind Direction (deg)	Wind Speed (mph)	Gusts (mph)
0	76	9	239	10	20
1	69	20	346	13	19
2	68	27	333	10	18
3	66	31	324	8	17
4	64	34	327	8	14
5	60	37	352	4	12
6	58	40	127	2	8
7	57	39	240	2	5
8	61	38	327	2	3
9	64	30	97	4	8
10	69	27	82	4	8
11	73	26	354	3	10
12	79	22	27	4	7
13	82	17	346	5	11
14	84	18	335	5	10
15	86	16	130	5	13
16	85	15	237	3	18
17	91	12	229	5	24
18	90	11	197	12	22
19	90	10	221	10	19
20	86	10	192	13	20
21	83	11	199	10	17
22	80	11	201	13	17
23	79	11	194	15	22

Wednesday, July 6, 1994					
Hour (MDT)	Temp (deg)	Relative Humidity (%)	Wind Direction (deg)	Wind Speed (mph)	Gusts (mph)
0	79	11	195	15	25
1	74	12	25	4	21
2	74	13	253	6	15
3	66	19	108	4	7
4	65	20	136	6	12
5	60	27	297	5	8
6	60	29	1	3	8
7	58	31	349	3	7
8	61	28	334	4	8
9	71	22	26	2	6
10	74	22	335	2	5
11	77	18	316	7	12
12	79	14	276	17	29
13	81	14	287	16	35
14	84	13	***	21	40
15	84	12	276	20	41
16	83	10	254	29	45
17	83	8	268	24	44
18	83	8	272	20	42
19	78	12	323	14	37
20	74	14	334	19	35
21	69	18	332	13	40
22	62	24	334	9	25
23	59	25	357	5	20

Table W-1

Grand Junction, Colorado Weather Data Elevation 4843 Feet

Tuesday, July 5, 1994					
Hour (MDT)	Temp (deg)	Relative Humidity (%)	Wind Direction (deg)	Wind Speed (mph)	Gusts (mph)
0	75	9	80	9	
1	76	8	80	10	
2	75	11	50	6	
3	71	14	280	10	
4	72	26	40	12	
5	68	29	150	7	
6	68	31	70	7	
7	67	32	330	6	
8	70	35	140	6	
9	74	29	130	8	
10	78	22	130	9	
11	82	20	190	7	
12	86	14	90	7	
13	90	12	180	5	
14	91	11	200	6	
15	93	11	280	6	
16	94	10	240	8	
17	95	10	210	10	
18	94	9	180	15	
19	94	8	190	15	
20	91	8	200	13	
21	84	10	180	10	
22	80	12	130	9	
23	79	12	120	12	

Wednesday, July 6, 1994					
Hour (MDT)	Temp (deg)	Relative Humidity (%)	Wind Direction (deg)	Wind Speed (mph)	Gusts (mph)
0	77	12	100	10	
1	77	12	50	8	
2	76	13	160	12	
3	74	15	120	15	
4	71	17	60	8	
5	69	19	120	13	
6	69	19	100	13	
7	69	20	140	10	
8	74	18	140	10	
9	79	17	190	9	
10	82	13	270	9	
11	82	14	320	16	
12	87	13	340	10	
13	88	12	300	22	29
14	89	10	300	20	32
15	89	9	280	18	35
16	89	9	270	25	32
17	89	7	300	18	35
18	88	8	280	21	33
19	86	9	330	21	32
20	82	11	320	29	
21	76	13	320	25	
22	73	15	320	17	
23	68	18	320	16	

Table W-2

Red Flag Forecasts

Red flag forecasts are issued by the National Weather Service to inform fire management agencies of the possibility or onset of critical weather and fuel conditions that could lead to extensive wildfire occurrence. Red flag conditions normally require the combination of HIGH to EXTREME fire danger (as determined by the National Fire Danger Rating System) and critical weather conditions (as determined by the Fire Weather Meteorologist). The Denver Fire Weather Office uses the following weather conditions to issue red flag forecasts:

1. A significant increase in wind speeds, i.e. sustained winds of 20 mph with stronger gusts.
2. A dry thunderstorm outbreak, a LAL (Lightning Activity Level) of 6.
3. A significant decrease in relative humidity.
4. A significant increase in temperature.
5. The first episode of thunderstorms after a hot, dry period.
6. A Haines Index of 6.
7. Any combination of weather and fuel moisture conditions that in the judgment of the Fire Weather Meteorologist would cause extensive wildfire occurrence.

Since many combinations of weather conditions and fire danger can lead to red flag conditions, no truly objective criteria can be set to determine exactly when a red flag event should be forecast. When red flag conditions are forecast, either a red flag watch or a red flag warning is issued by the Fire Weather Meteorologist.

A red flag watch is issued to advise land management agencies of the possible development of red flag conditions in the near future. A watch is issued when the meteorologist is reasonably confident that a red flag event will occur within the next 12 to 72 hours.

A red flag warning is issued when the meteorologist is aware of ongoing red flag conditions, or when there is high confidence that red flag conditions will occur within the next 24 hours.

Between June 1 and July 6 of 1994, The Denver Fire Weather Office issued 10 red flag warnings for the Grand Junction BLM District. Red flag warnings were issued for June 13, 15, 18, 26, and 28, and were in effect from July 2-6. The red flag warning for July 6 was unique in that it was issued for strong winds associated with a cold front. All other red flag warnings were for a combination of dry lightning and low relative humidity.

Appendix 2 — Fire Behavior

Analysis of fire behavior on the South Canyon incident is focused on the following questions.

1. Could the fire behavior on the afternoon of July 6, 1994, have been predicted from known information and forecasts available either on the afternoon of July 5 or the morning of July 6?
2. What changes in fire behavior, if any, could have been surmised on July 6 from fire danger indices, drought indices, or other general ratings of fire danger?
3. What fire behavior was observed on the fire?
4. What was the calculated fire behavior?

Potential Fire Behavior

In previous investigations the category Predicted Fire Behavior was used to describe predictions made by fire behavior specialists. Investigators have sought to contrast predicted to observed fire behavior and to determine whether miscalculation was a causal factor. In the case of the South Canyon fire, no predictions of fire behavior were made before the tragedy. The category Potential Fire Behavior is used here to determine whether the fire behavior prediction systems could have been used to predict the fire behavior observed on the afternoon of July 6.

Fire behavior was predicted using information and tools available on July 5, 1994. The inputs were derived from the fire weather forecast issued at 1930 hours on July 5 for July 6 and the National Fire Danger Rating System (NFDRS) outputs for July 5. The forecast is found in Appendix 1, Weather. The fire behavior was predicted using the BEHAVE system, a software program developed by Patricia Andrews and Carolyn Chase of the Missoula Fire Lab. Similar results could also be derived using the nomograms, charts in the Fireline Handbook or by the using the HP71B calculator.

Inputs & Data Sources for Potential Fire Behavior Calculations

Fuel Models:	5	Model 5 is used to model fire behavior in low live brush. It is a conservative model for the Gambel oak fuel type.
	2	Model 2 is used to model fire behavior in pinyon-juniper with a grassy understory.
1-Hr FM	2-5	1 hour fuel moistures were calculated using the forecast temperature and relative humidity for the time when the cold front was expected to pass based on the forecast for July 6 issued on the afternoon of July 5 at 1930. Fuel moistures were calculated both for clear and cloudy conditions to develop a range.
10-Hr FM	3	Value from Rifle RAWS Station
Live Woody FM	59	Value from Rifle RAWS Station
MFWS	12	Value from forecast for July 6 for time of frontal passage. The 20 foot winds were reduced assuming that the fuels are partially sheltered.

Table FB-1

South Canyon Fire

Forecast Indices

Forecast for Date	Fuel Model	Burning Index		Ignition Component	
		Rifle NFDRS Station	Pine Ridge NFDRS Station	Rifle NFDRS Station	Pine Ridge NFDRS Station
July 4	H	51	36	53	49
	T	70	68	48	46
	F	37	111	51	65
	A		41		40
July 5	H	32	35	36	58
	T	42	66	30	52
	F	24	111	36	78
	A		43		47
July 6	H	146	53	100	NA
	T	107	114	100	NA
	F	51	119	100	NA
	A		243		90

Table FB-4

often used for general fire danger in the Grand Junction District. The forecast values were available on the previous afternoon to assist in planning and setting fire management priorities for the next day. Complete data for all stations is on file.

Legend

- F = Mature closed chamise stands and oak brush fields of AZ, UT and CO
- T = Sagebrush - grass types of Great Basin and Intermountain west
- H = Healthy stand of short needled conifers
- A = Western grasslands vegetated by annual grasslands and herbs

Interpretation of the burning index is made by comparing the forecast value or the observed value with the high and low percent (80th and 95th percentile) from the historical record for the stations. The high and low percent values for the Rifle and Pine Ridge fire stations are shown in Table FB-5. The burning index for July 5,

1994, for the two stations was below the high percentage threshold (95th) for both stations for all fuel models except one. The forecast burning index for July 6 was well above the high percentage threshold for both stations for every fuel model due to the predicted winds. The marked difference in values (percentage change between the 2 days) suggests a corresponding increase in fire behavior between that observed on July 5 and that forecast for July 6.

Threshold Values for Burning Index (1977-1991)

Location	Fuel Model	Low 80th %	High 95th %
Rifle NFDRS Station	F	43	97
	T	56	89
	H	31	44
Pine Ridge NFDRS Station	H	31	41
	T	55	81
	F	44	97
	A	36	47

Table FB-5

Trends In Fire Danger Indices

The Firefamily program can be used to analyze long term trends in fire danger indices. Two of the fire weather stations in the Grand Junction area, Walker and Colorado National Monument, have been established for more than 20 years. Five other stations have been in place for 5 years. Colorado National Monument was selected for analysis of long-term trends. It should be noted that the graphs of these indices are compiled from a database that has not been edited. A thorough and accurate display of the information would require checking and editing the database, a time consuming process that was not completed by the investigators. However, the analysis gives a good idea of the level of fire danger at the time of the South Canyon fire as compared to the average for the previous 20 years and to 1976, another serious fire season in the record.

Tables FB-6 and FB-7 display the trends in BI (burning index) and ERC (energy release component) for the station. Missing data in the yearly records is graphed as 0 for the July entries.

The burning index in early July was above the 95th percentile for the station. The year 1994 defines the maximum values in 20 years for most days in early July.

The energy release component in early July 1994 was above the 95th percentile for the station.

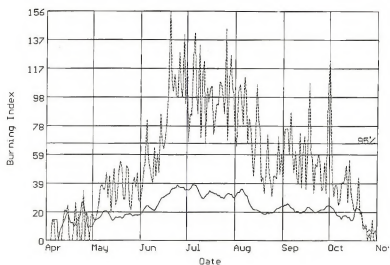
The ERC and BI for the station were above average values for June starting when the weather observations were initiated in 1994. Beginning in late June the values were well above the average for that time of year and approaching the maximum values recorded since 1973. This information paints a graphic picture of the severity of the fire season.

Actual Fire Behavior

Descriptions of the actual fire behavior are a combination of eyewitness descriptions and calculations using the BEHAVE FIRE1 system. Throughout the narrative calculated and observed values are differentiated.

The fire behavior on the afternoon of July 6 is referred to in the body of the report as a blowup. A blowup is defined as a sudden increase in fire-line intensity sufficient to preclude immediate control or to upset existing suppression plans, often accompanied by violent convection. The fire behavior on the South Canyon fire was estimated using the fire spread model. Although rates of spread and intensities were high, the observed behavior did not violate the assumptions of the spread model.

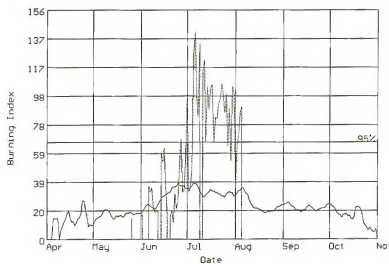
Season Plot - COLORADO



Average _____

Maximum -----

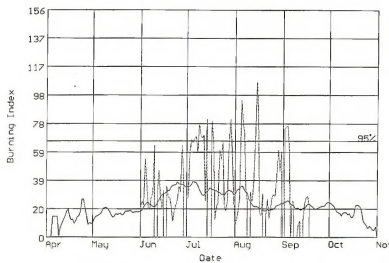
Season Plot - COLORADO



Average _____

Year 1994 -----

Season Plot - COLORADO



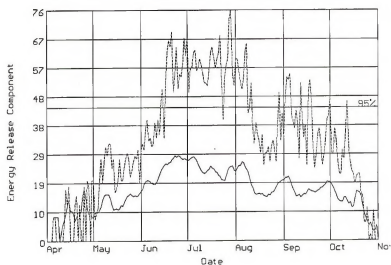
Average _____

Year 1976 -----

Table 6: Burning
Index Model F
1973-1994

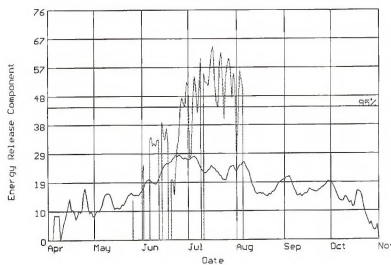
———— Average
 - - - - - Maximum

Season Plot - COLORADO



———— Average
 - - - - - Year 1994

Season Plot - COLORADO



———— Average
 - - - - - Year 1976

Season Plot - COLORADO

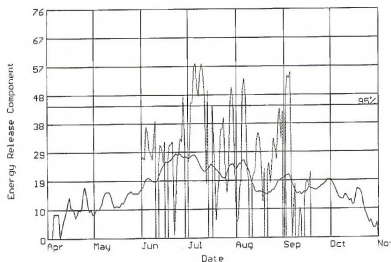


Table 7: Energy
 Release Component
 Model F 1973-1994

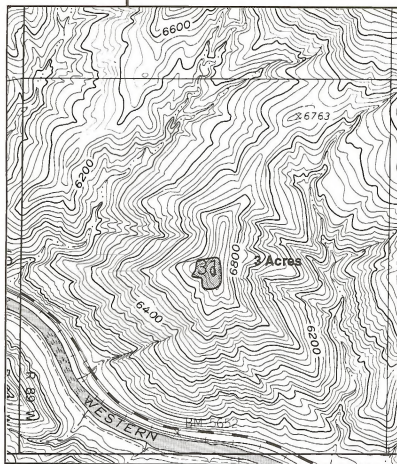


Figure FB-2: 1200 July 4

July 3 and 4

The fire was ignited by lightning on the afternoon of July 2. The fuel type was sparse pinyon-juniper with an understory of cured bunchgrasses and annual grasses. The terrain in the area of the ignition was steep and rocky. Since the fire was ignited near the high point of the ridge, most of the behavior over the next 48 hours consisted of backing with occasional short runs up the slope. Residents and observers reported occasional torching of trees (pinyon and juniper). The fire covered 3 acres by 1200 hours on July 4 and grew to 11 acres by 2200 hours (Figures FB-2 and FB-3).

July 5

The fire flanked along the west side of the ridge toward the northwest and grew to 29 acres by 0800 hours

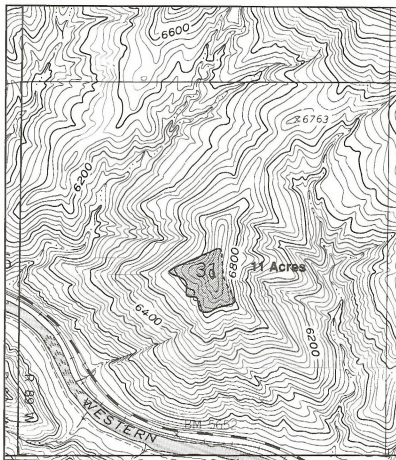


Figure FB-3: 2200 July 4

on July 5 (Figure FB-4). It continued to back and make short runs in the pinyon-juniper vegetation type. By 2000 hours it had grown to 50 acres (Figure FB-5) and had burned into the large patch of Gambel oak (*Quercus gambelii*) shown on the fuels map (Figure FB-6). The brush was dense and ranged from 6 to 12 feet high. A mat of leaves and litter approximately 2 to 3 inches deep covered the ground under the shrubs.

July 6

The fire remained active throughout the night. RAWs data shows little or no relative humidity recovery. The fire had flanked 1,000 feet by the time fireline construction began at 1000 hours that morning. The fire in the litter under the Gambel oak was moving laterally at a rate of about 70 feet per hour and backing down the slope at a similar rate.

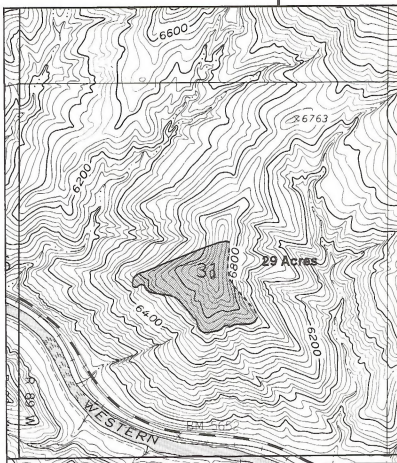


Figure FB-4: 0800 July 5

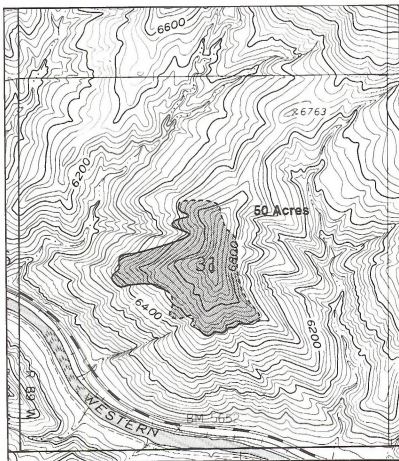


Figure FB-5: 2000 July 5

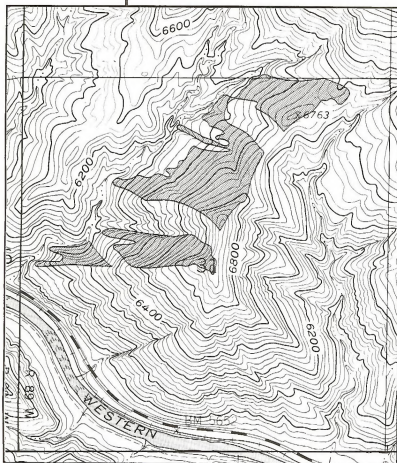


Figure FB-6: Gambel Oak Distribution Map

Observed flame lengths were 6 to 8 inches long. Few observations of the progress of the fire downslope to the south of the lunch spot are available, but the fire was mapped at 0900 hours on a reconnaissance flight, showing it to be on the slope above the west drainage.

As the morning progressed, the fire gradually became more active. By midmorning it covered 127 acres (Figure FB-7). Crews working on the ridgeline conducted a small underburn of patches of Gambel oak litter next to the fireline in the late morning. As winds picked up, the fuels dried. As the morning got warmer, there were several small slopovers along the ridgeline. A small reburn originating downslope from the intersection of the west fireline and the ridgeline also ignited a spot fire on the ridge.

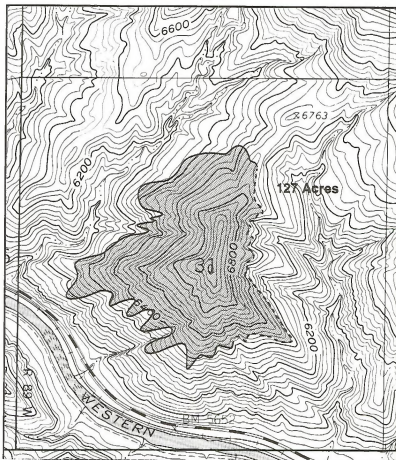


Figure FB-7: July 6

Observers at the heliport along the Colorado River and in the local community recorded the fire behavior on the sides of the fire away from most of the line construction. The fire was active all along the perimeter in the pinyon-juniper fuel type. It continued to back down the slope and make short runs with occasional torching of trees. Starting at 1543 hours, the fire made several runs in the burn south of the lunch spot. Three smoke-jumpers observed the reburn of underburned pinyon-juniper and Douglas-fir forest (Photo 4 on page 12 of the Incident Overview). They described 100-foot flames in this flareup within the previous burn.

At 1600 hours as the winds reached their highest velocity, the fire reached the bottom of the west drainage, which it crossed at Point A (Figures FB-8 and FB-9 and Photo FB-1). The fire ignited the opposite side of the drainage and moved rapidly to the top of the opposite ridge. The fire moved up the west side of the drainage pushed by 30 mile per hour winds (Points B and C). The fire took an estimated 10 to 12 minutes to progress up the canyon to Point D (Tables FB-8 and FB-9). Taken from the opposite ridge, Photo 8 (page 16 in the Incident Overview) shows the head of the fire on the east side of the drainage at Point D. The head of the fire is not clear in the photo in the printed document but is visible in enlargements on file.

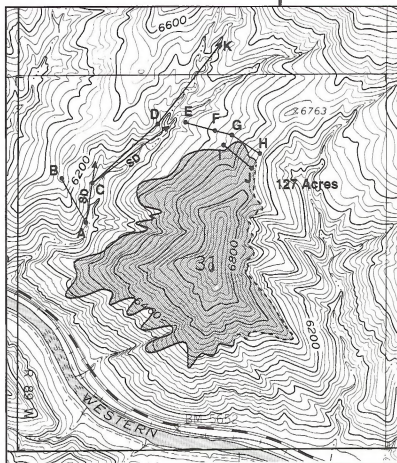


Figure FB-8: Fire Behavior Calculations

South Canyon Fire

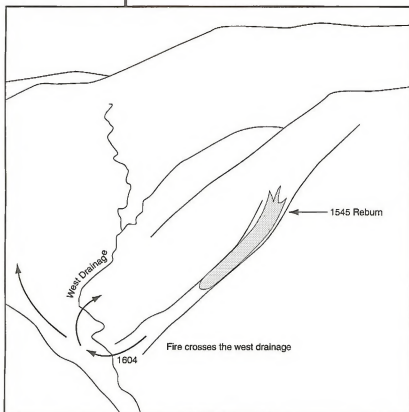


Figure FB-9

physical evidence on the site and the fire behavior puts the time closer to 2 minutes. Tables FB-8 and FB-9 show the calculated rates of spread and flame lengths between fire behavior projection points on the map and the calculated times between key points on the fire. The firefighters on the line were overtaken by the fire from below and to the north of them. This is demonstrated in Photo 8 (page 16 of the Incident Overview) and also by the burn pattern.



Photo FB-1

The fire was observed to spot to the east side of the drainage at Point E below the crew that was walking out the fireline to the ridge. The observer was in a location 210 feet below the ridgeline. The spot fire moved from sparse pinyon-juniper and Gambel oak with a grassy understory to dense Gambel oak on a slope that steepened to 50 percent. Racing up the slope, the fire was influenced by stronger winds of 45 miles per hour. The spot fire took an estimated 2 minutes to reach the ridgeline.

During the run its calculated rate of spread accelerated from 246 to 856 chains per hour (3.1 to 10.7 mph). An eyewitness estimates that it took 30 seconds for the spot fire to move to the ridgeline, but the

The fire continued to move up the west drainage. Calculated spread rates indicate that approximately 7 minutes elapsed from when the spot fire was observed to when the two helitack crew members were overtaken by fire at the head of the drainage at Point K.

Once the fire moved inside the fireline to the underburned Gambel oak rates of spread were approximately double those calculated for the green Gambel oak outside the fireline. These rates of spread may have been as high as 1,480 chains per hour (18.5 mph). As the fire moved higher on the slope, it was influenced by higher winds (Figure FB-10). Contributing to this maximum rate of spread were a 45 mph wind, steep slopes, and fuel moistures of 60 percent in the brush that had been dried by the surface fire.

Calculated Times Between Points on the Map		
Points	Description	Approx. Time
A to C	The fire crosses the main drainage and spreads up the slope to the opposite ridge.	4 min, 19 sec
C to D	The fire spreads up the drainage on the west side and is visible in photo 8 at point D.	6 min, 24 sec
E to F	The fire spots to the east side of the drainage and spreads uphill through the open brush on the lower slope.	108 sec
F to G	The fire enters the dense Gambel oak on the lower slope and spreads to the steep slope.	20 sec
G to H	The fire burns through the dense Gambel oak and spreads to the ridgeline, overtaking 12 firefighters.	31 sec
D to K	The fire moves from the point visible in photo 8 to point K where it overtakes two helltack crewmembers.	7 min, 12 sec

Table FB-8

Calculated Rates of Spread and Flame Lengths					
LOCATIONS		RATE OF SPREAD			FLAME LENGTH
		Chains/ Hour	Miles/ Hour	Feet/ Minute	Feet
East Side					
Upslope to Ridge		127	1.6	140	12
Upcanyon to Observed Point in photo 8.		177	2.2	195	15
Spot Fire					
Pinyon-Juniper	30% Slope	246	3.1	271	17
Gambel Oak	30% Slope	591	7.4	650	54
Gambel Oak	50% Slope	856	10.7	941	64
Underburned Oak	50% Slope	1480	18.5	1628	86.3

Table FB-9

South Canyon Fire

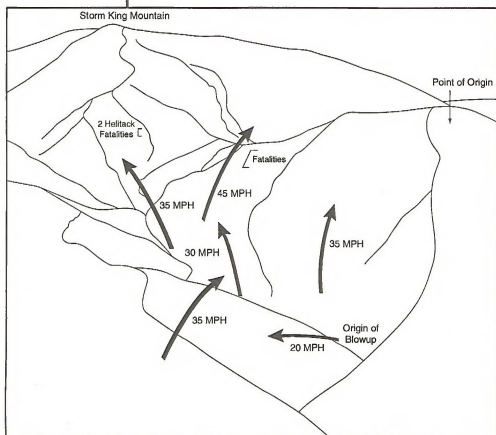


Figure FB-10

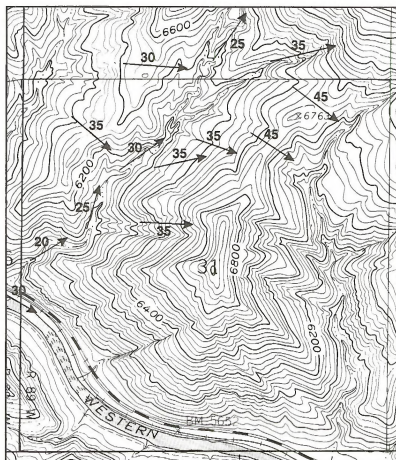


Figure FB-11

All fire behavior projections were made using the vectors, wind vectors, and fuel mapping shown in Figures FB-6, FB-8, and FB-11. Worksheets and calculations are on file.

Fuel Moisture

The live fuel moisture in shrubs is not sampled on a routine basis in the Grand Junction area. Samples of live fuels, however, were collected at two sites on July 12, 1994. Samples could not be taken on the South Canyon fire because all the fuels were consumed.

Samples of underburned brush were taken at a similar elevation and aspect on the next ridge to the west on the fire (Photo FB-2). The moisture content was 59 percent.

Samples of green Gambel oak were taken on a similar aspect and elevation east of the fire area along Transfer Trail. The moisture content was 125 percent. This is lower than the values recorded in green Gambel Oak at the time of the Battlement Creek Fire in 1976.

Fuel Mapping And Models

Mapping

The relative distribution of the major fuel types in the fire area were determined using aerial photo interpretation and ground truthing. They are shown on the fuel type drawing in the Incident Overview and the fuel type map (Figure FB-6). Photo FB-3 shows the fuels on both sides of the fireline at a location on the west flank of the fire near the bottom of the line. Photo 8 (page 16 of the Incident Overview) shows the Gambel oak fuels on the inside of the line near the fatality site. Both photos reveal that the aerial fuels were intact and continuous both inside and outside the fireline along the west flank.



Photo FB-2

Fuel Models

Model 2

Model 2 was selected to describe the pinyon-juniper vegetation found on most of the south- and east-facing aspects in the fire area. Model 2 was selected because the main carrier of fire in these areas is grass that is partially shaded by the trees and shrubs. This vegetation type is quite open in the fire area. A few areas of very sparse tree-sized Gambel oak with a grass understory are also categorized as Model 2.

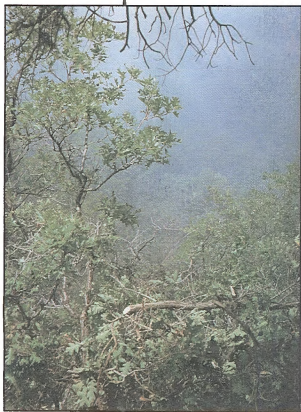


Photo FB-3

Model 4

The Gambel oak on the South Canyon fire ranged from 6 to 12 feet in height. It was very dense and continuous. It was not affected by frost the previous spring and appeared to be green and growing. It did not contain much dead material. The age of the brush is unknown since no previous fires have been recorded for the site. Model 4 was selected to describe the Gambel oak fuel type because it was found to best match the fire behavior observed in Gambel oak on the South Canyon fire. It is the model used in the Battlement Creek fire report (1976) and is also used to describe some areas of very dense pinyon-juniper with canopy closure.

Appendix 3 — Entrapment Response And Analysis

At the time this appendix was written, autopsy reports and coroner photos needed for a complete analysis had not yet been released. In addition, witnesses who could add new information for the entrapment response had not been interviewed but may be contacted later. Until all reasonably available information has been considered, this analysis is incomplete.

Jumper Deployments (No Fatalities)

Crew Movement

When the Jumper in Charge gave the order to go back up to the Helispot 1, eight of the nine smokejumpers proceeded up the ridgeline. As conditions worsened, they left three saws, gas, and some tools in small openings but kept their packs with them. When one jumper's legs began to cramp up, he and another smokejumper deployed their shelters and got under them in a small opening on the ridgeline. The other jumpers continued up another 100 yards to a larger opening, and all six deployed their shelters. This site is on the ridgeline about 100 yards below Helispot 1.

The ninth smokejumper was well below the other eight and on a spur ridge towards the South. He worked his way back to the main ridge to the large opening designated the "lunch spot." He did not deploy a fire shelter and stayed in this area throughout the entrapment.

The ridge along which all nine smokejumpers stopped has many grassy areas scattered among sparse pinion-juniper stands. The larger grassy openings on benches along the ridgeline are good deployment sites.

Site Analysis

Radiant heat fluxes from fire runs to the south were .5 cal/cm²/sec or lower. Temperatures would be 300-800° F. These conditions are usually not life threatening even without a fire shelter, but radiant heat burns would be likely. Shelters in this area prevented radiant burns and would considerably reduce smoke inhalation.

Only one shelter in this area was examined, and it showed no heat damage. Two of five PVC plastic bags were partially melted, and three had no damage, showing only spotty burning of ground fuels in the immediate area.

Lower down at the "lunch site" the single jumper did not receive burns or significant smoke inhalation. The grass in this opening did not burn.

Summary

With the exception of the smokejumper at the lunch site, all firefighters at this location took actions that maximized their safety, comfort, and survival. All entrapment sites were well chosen and were the best spots in the immediate vicinity. These jumpers remained in their locations for about 1 to 2 hours, then proceeded to the main entrapment site to check for survivors.

Escape From The Ridgeline

Crew Movement

Those who escaped the fire were mainly BLM/Forest Service firefighters, Pineville Hotshots, and smokejumpers working on top of the ridge. These crews were removing fuels, digging fireline, and catching spot fires on the ridgeline. At the time of the blowup there was some indecision about the best escape route to take. After attempts to move up to Helispot 1 were cut off by the fire, all three crews decided to drop off the ridgeline into the east drainage but chose different routes down. The route out the east drainage was not a pre-established escape route.

Site Analysis

The heat fluxes on ridgetops would have been up to 1 cal/cm²/sec and below with temperatures below 1200° F. A shelter dropped on top showed no damage, but packs and tools burned on the ground were likely ignited by ground fires after the flame front subsided. Wider spots on the ridgetops are generally safe deployment sites in the absence of heavy ground fuels. Fire shelters are usually deployed safely on the lee side of ridges from the flame front with movement back towards the center of the ridge if the other side ignites.

Spot fires were observed higher up the east drainage, so it was a gamble whether a spot fire would ignite below the escaping crews. The crews moved quickly down to the highway, arriving there before this canyon burnt out. Smoke and visibility were not problems in the canyon, and the downhill route allowed rapid egress. Most these firefighters had fire shelters and were prepared to deploy them should a fire come up from below.

Summary

Under very adverse conditions these people made the decision to head down the east drainage. Recognizing that the entire canyon had the potential to burn out, they rapidly moved down canyon. They also had injured people, and this was the quickest way to get them out for aid. They had a backup plan to find alternate deployment sites if necessary. Considering the number of people and the rapid descent, this was a well executed escape.

Entrapment Along The West Flank (12 Fatalities)

Crew Movement

When the Jumper in Charge gave the order to escape, he headed north along the west flank and met up with the Prineville crew and the smokejumpers. This crew was likely digging line at the time. From their estimated location they moved about 1,425 feet to where they were trapped, carrying all their tools and equipment as they moved towards the saddle at the top of the fireline. It is estimated that they walked 1,108 feet and ran the last 317 feet.

Afternoon temperatures were in the low 80s and possibly cooler under the Gambel oak. There was no mention of smoke hindering breathing or visibility. Before arriving at this fire, members of all crews would have been acclimatized to both heat and altitude. Heat and altitude thus were not significant factors. The dense Gambel oak would have hindered rapid movement, so the only escape option was back along the fireline. With limited visibility, the firefighters may have relied mainly on hearing to track the fire progress across the canyon below them. As they started out, their main challenge was to pace themselves to get to this saddle as quickly as possible. It is estimated that they walked for about 5 minutes, moving 1,108 feet.

The fire, which had crossed to the adjacent hillside, kept pace with the crew's retreat. When the fire spotted back onto the slope below them and started uphill towards the saddle, its rate of spread increased. The crew started running toward the saddle, and within a minute two smokejumpers stopped to deploy their fire shelters. Nearby, two firefighters observing the crew running toward them and two firefighters coming up behind the smokejumpers continued to run up to the top of the ridge, 212 feet further up the hill.

Three of the firefighters barely reached the top of the ridge before the fire and received radiant heat burns before cresting the ridge. A fourth firefighter was caught 121 feet from the top. Below, the two smokejumpers fully deployed their fire shelters, but the remaining firefighters did not have time to get under their shelters before the fire caught them. All crew members were still carrying tools and packs when they stopped to deploy shelters.

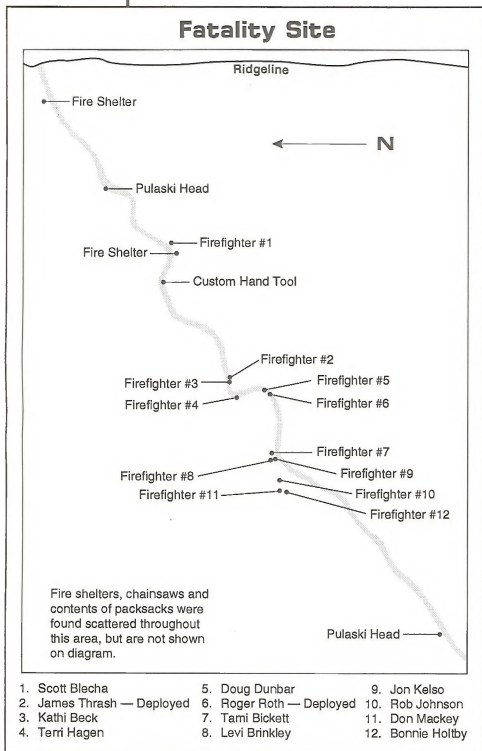
Site Analysis

A clear temperature gradient exists from the bottom of this entrapment site to the top of the ridge. Six people were found in a group 270 feet from the top, five people were found in a group 212 feet from the top, and a single person was found 121 feet from the top.

South Canyon Fire

For the bottom group of six, estimated heat fluxes were 2 cal/cm²/sec, and temperatures were in the 1600-2000° F range. This site was not survivable

Fatality Site



even in a fire shelter. Except for fire shelters, all items dropped on the ground were completely consumed.

In the middle group two people were able to get under their fire shelters, and the three others did not have time to get their shelters fully opened. Estimated heat fluxes were about 1 cal/cm²/sec, and temperatures were in the 900-1600° F range. At this level some tools and items dropped were only melted or partially consumed. Fire shelters have worked successfully in these conditions in other instances. Fire shelter failure was likely due to an interaction between the heat, which would cause delamination between the foil and glass cloth, and extreme turbulence which would cause the foil to start cracking and then tear off in pieces. In addition, shelters were deployed perpendicular to the direction of the flame front rather than the

recommended orientation of feet toward the flame front. This shelter orientation increased the effect of the turbulence and the chance for flames to enter the shelters. Flames under the shelter can cause disintegration within seconds.

One person's shelter blew off from the foot end, turning inside out and exposing the occupant to increased heat. Packs within the shelter contained fusees, which when touching the side of a shelter would easily ignite and could have melted the glass webbing hold-down straps. Alternatively, the occupant may have moved his feet up away from the fusees, thereby releasing the shelter bottom. Also the fusees may have ignited after the shelter blew off or after the shelter disintegrated from the heat and turbulence of the flame front.

The other firefighter under a shelter also encountered complications. Evidence suggests that the person to his left lifted the edge of the shelter off the ground and may have been partially under the shelter. The occupant rolled over onto the right side of the shelter, lifting the left edge off the ground. Since the flame front was passing from left to right, flames are likely to have entered the shelter. Alternatively, shelter failure starting on the left side may have caused the occupant to roll over to the right side.

In both cases, shelters coming off the ground would destroy the shelters, voiding the occupants' main protection. It is not clear if conditions at this level reflect marginal shelter operational conditions or if human error contributed to the failure of the shelters.

The evidence from burn patterns indicates that the flame front came across the fireline at an angle toward Helispot 1. The six people at the bottom of the site were caught fully in the flame front, with the people in the middle more on the upper edge. After the main flame front passed, the wind changed to straight uphill to the saddle. This crossing pattern gave the people who ran out the top extra time to escape before the fire turned back toward them.

At the top, site conditions were well within the fire shelters' design. Heat fluxes were below 1 cal/cm²/sec, and temperatures were below 1200° F, with ground temperatures in the 300-600° F range. Polyethylene canteens were partially melted, indicating that this site is survivable in fire shelters.

Since this crew walked part of the way out, an analysis was made based on the assumption that they ran all the way out. Another analysis assumed that they dropped all their packs and tools and could move quicker exerting the same amount of energy. Both analyses reveal that the firefighters would have reached the top of the ridge before the fire if they had perceived the threat from the start.

Summary

There was a clear temperature and heat flux gradient from the bottom of the site to the top. Survivability increased the further up the hill people went. Actions such as running and dropping packs and equipment would have resulted in greater survival chances further up the hill or over the top.

Helitack Crew (Two Fatalities)

Crew Movement

When the crews were given the word to initiate escape actions, two helitack crew members choose to run north along the ridgeline. The survivors yelled for the two helitack crew members to follow them, but the two helitack yelled back that the others should follow them. As these two headed north along the ridgeline, they passed through areas with high shelter survival rates. At some point they left the ridgetop and headed northwest into a narrow chute with minimal survival chances. Possibly brush and smoke obscured the chute. From the ridge the land looks smooth and there is a large rock outcrop on the other side of the chute, which was their likely goal. A game trail contours from the ridgeline over to the chute below the rock outcrop and was their likely route. The fire caught them in the draw below the rock outcrop. Both people carried their tools, packs and flight helmets into this site.

Site Analysis

Heat flux here is estimated at 1-2 cal/cm²/sec with temperatures in the 1200-1800° F range. Items dropped on the ground were completely consumed at the lower end of this site with some partially consumed items near the top (40 feet away). Some dissipation of heat is apparent due to less charring on the trees further up the chute near the rock outcrop.

Both victims started to deploy shelters but were overcome by heat and smoke before they got the shelters fully opened. Although shelters normally work well in rock piles, the funnel effect for heat and smoke in this location made the shelters unsurvivable. Helitack firefighters Richard Tyler and Robert Browning perished at this site, with Tyler a littler higher in the chute than Browning.

Summary

It is not clear why the two helitack firefighters did not join the others going down the east drainage unless they felt it was ready to burn out. Since they left the relative safety of the ridge, they either did not recognize the good deployment spots or felt the rock outcrop offered more safety. If so, they only needed another minute to get there and possibly would have made it if they had run without tools and packs. In addition, smoke from the fire below probably interfered with visibility and breathing and slowed their progress.

Appendix 4 — South Canyon Fire Chronology

June 14

The Grand Junction District Management Team discusses the high fire danger and decides that, because of severe fire conditions and limited fire-fighting resources, all fires will be initial attacked and put out as soon as possible.

July 2

Grand Junction District has 22 new fire starts and six carryover fires, two of which are Type II. At about 1800 hours Mrs. Temple of the Glenwood Springs area observes a lightning strike that hits a tree on the ridge east of her house. Shortly thereafter she sees smoke but no flames on the ridge.

July 3

Grand Junction District is in moderate to very high fire danger conditions and planning level 4 (on a scale of 1-5). Lightning storms over the past 2 days have started more than 40 fires. The District has developed a priority list for initial attack. Winds have hampered the use of aircraft. Initial attack resources are taxed, and more lightning is scheduled for tomorrow with a red flag warning.

- | | |
|------------|---|
| 1100 hours | Garfield County Sheriff reports the South Canyon fire to Grand Junction District Dispatch. The initial report considers the fire to be on private land. Reporting the fire to be two trees torching and to have a high spread potential, the Garfield County Volunteer Fire Department asks if it can get air support. The District Fire Management Officer replies that the district is fully committed but that air attack assistance will be requested if action is needed. Dispatch asks if the Sheriff will approve air support (according to an agreement for private lands). |
| 1410 hours | The Sheriff's Office reports to District Dispatch that the fire covers a half acre and is very active and that the Sheriff approves the use of aircraft. |
| 1412 hours | Dispatch radios District Fire Control Officer Winslow Robertson, asking him to respond. He is enroute from Rifle. |
| 1416 hours | Dispatch calls Western Slope Fire Coordination Center and requests one load of jumpers (J49), an air tanker (T140), and |

South Canyon Fire

- 0832 hours Grand Junction Dispatch orders one load of eight jumpers with a requested delivery time of 1200 hours.
- 1420 hours Blanco orders one retardant drop.
- 1500 hours The air tanker drops retardant along the fireline built down the hill to the west from Helispot 1.
- 1716 hours Blanco receives the second air tanker drop on the flank over the highway. The pilot discusses the location of the drop with Blanco and the problem of rolling rocks on Interstate 70. The pilot says he cannot safely meet Blanco's needs and recommends a helicopter with bucket as much more efficient.
- 1730 hours Taking a route down the west side, the BLM crew leaves the fire because all of their chainsaws are broken. On the way out, Blanco discusses with the crew the hazards of building a fireline downhill.
- 1745 hours Smokejumpers Mackey, Doebling, Woods, Rhoades, Soto, Archuleta, Shelton, and Erickson arrive. The Spotter describes the fire as 30 acres, on extremely steep terrain, and burning downhill in all directions. The fire has potential to spread the next day if it gets into the bottom of drainages. Light winds are reported. A smokejumper reports that the winds are erratic and that jumpers are scattered over the flank of Storm King Mountain.
- 1944 hours Jumper in Charge Mackey calls Blanco on the radio and reports that fire has crossed the handline to the west and is burning actively.
- 2000 hours The smokejumpers start building a fireline down the east side of the fire from Helispot 1.
- 2230 hours The BLM crew and Blanco finish preparing their gear at the BLM District Office and cache and go home for the night.
- 2310 hours Mackey orders two Type I crews.

Not all resources were documented. Blanco may have requested more resources, but the requests were not recorded on either the resource orders or in the dispatch logs. Entries in the dispatch logs are made selectively, with a subjective decision made on what entries to write down.

July 6

Thirty-six fires are burning in the Grand Junction District. The fire weather forecast for the Grand Junction area: increasing high clouds in the morning, with winds of 10-20 mph by 1100 hours, winds increasing to 15-30 mph by 1300 hours. At about 1500 hours, surface winds will shift to the northwest at 15-25 mph and would gust to 30-35 mph with passage of the cold front. RED FLAG WARNING.

- 0030 hours Smokejumpers stop building fireline on the east side and return to Helispot 1. Line construction is ineffective and dangerous because of poor footing and many rolling rocks.
- 0300 hours The fire is burning actively on the ridgeline with 10 mph winds blowing from the east. Smokejumpers decide to move their gear first thing in the morning because the fire could threaten it at the jump site.
- 0430 hours Dispatch relays to the Incident Commander via telephone a summarized version of the fire weather forecast. The report forecasts windy conditions with passage of the cold front.
- 0430 hours The BLM/Forest Service crew of 11 begins its 3.5-hour hike to the fire, taking an east drainage route that differs from the previous days. Expecting to spend the night, the crew carries extra saws, gas, food, and water.
- 0528 hours Mackey orders a helicopter with a long line for gear removal, reports that fire grew during the night, and requests a fixed-wing aircraft with an aerial observer. He plans to finish the fireline from Helispot 1 along the ridge to the north and gather the jump gear.
- 0630 hours Prineville Interagency Hotshot Crew is assigned to fire.
- 0709 hours Mackey calls Dispatch requesting that the Prineville Hotshots be ferried into the fire by helicopter and that he have the use of the helicopter for reconnaissance.
- 0800 hours The BLM/Forest Service crew arrives at the Helispot 2 site and starts cutting the helispot. Smokejumpers and the BLM crew build a fireline from Helispot 1 to Helispot 2, burning out islands of unburned fuel along the ridge.
- 0800 hours The Prineville Hotshot Crew departs Grand Junction.
- 0830 hours The smokejumpers complete a scratchline between Helispots 1 and 2 and then go to the jump site to gather their gear.

South Canyon Fire

- 0845 hours Blanco and Mackey discuss strategy and tactics for the day. They plan to improve and widen the headline between Helispots 1 and 2. They intend that half of the Prineville Hotshots work with the jumpers building the fireline on the west, and the other half build a fireline on the east side of the fire.
- 0900 hours Some of smokejumpers and Blanco listen to the NOAA radio channel and receive the Grand Junction area weather forecast.
- 0915 hours In response to community concern, Glenwood Springs Fire Chief requests information on how many people and how much equipment are on fire. Blanco is told that he can keep the smokejumpers and is informed that a second load will soon be heading his way.
- 0930 hours Helicopter 93R arrives at fire, but only 4 hours of flight time are available because Western Slope Fire Coordination Center anticipates initial attack needs. Mackey and Blanco take a reconnaissance flight of the fire. Mackey radios smokejumpers on the ground, directing them to begin building a fireline downhill. The smokejumpers question Mackey's strategy, ask him if there are any safe areas, and say that they want to talk about the strategy when he completes his flight.
- 1027 hours The aircraft "Jumper 17" arrives over fire, and smokejumpers Hipke, Thomas, Petrelli, Longanecker, Cooper, Feliciano, Roth, and Thrash parachute out. Wind at this time is blowing at 0-5 mph.
- 1113 hours Jumper 17 leaves site.
- 1115 hours A tree torches 40 yards from the top of ridge and ignites a 5-foot wide reburn of Gambel oak. The fire runs to the top and causes a spot fire across fireline. The helicopter drops water, and the crew controls the spot.
- 1130 hours The smokejumpers start downhill, building a direct fireline from the location flagged by Mackey on the ridgeline. Longanecker is scouting the fireline. The smokejumpers are building a 6-7-foot wide line with a 16-18 inch scrape.
- 1200 hours The Prineville Interagency Hotshot Crew (IHC) arrives at helibase.

- 1230 hours Ten Prineville Hotshots arrive at Helispot 2. Mackey, Blanco, and Prineville Hotshot Superintendent Shepard discuss strategy and agree to send the first half of hotshots down to cut fireline with the jumpers on the west flank and use the second half to build fireline on the east flank. Blanco and Shepard go to Helispot 1 to discuss strategy.
- 1245 hours Nine hotshots start down hill.
- 1300 hours The fire flares up on west flank. The jumpers consider retreat but decide to proceed after an effective water drop.
- 1300 hours A cold front arrives in Grand Junction.
- 1330 hours Firefighters on the ridgeline break for lunch.
- 1400 hours Some jumpers and hotshots have lunch on the southwest corner of the fire at a designated location known as the lunch spot.
- 1430 hours After lunch Sara Doehring, Eric Hipke, and Kevin Erickson are directed to go back to help hotspot and improve the line.
- 1445 hours Mackey walks down from the ridgeline and directs Doehring and Erickson to carry the chainsaw back up the hill. Longanecker goes downhill to scout the next section of fireline off the lunch spot.
- 1500 hours The second group (10) of hotshots arrives at Helispot 2 and helps hold the fireline along the ridge. Longanecker goes down the hill to scout next section of fireline south from the lunch spot.
- 1515 hours The helibase reports that fire activity is picking up west of Helispot 1.
- 1520 hours As forecast, a cold front moves into fire area.
- 1523 hours The fire spots across the ridgetop fireline. Blanco asks Ryerson to scout the ridgeline. She is joined by Scholz (Prineville Hotshots), who reports that there are spot fires across the line. Bucket drops are called in. Blanco reports to Dispatch that winds have picked up and fire activity has increased.
- 1530 hours Crews complete widening fireline on the ridge between Helispots 1 and 2.

South Canyon Fire

- 1530 hours Longanecker (line scout west flank) requests two sawyers and diggers to help in the drainage. Thomas and Petrelli are sent. They observe increased fire activity. Longanecker gets a water drop.
- 1545 hours Fire rapidly runs up the draw within burned area toward Helispot 1 in several places above Longanecker with 100-foot flame lengths. Petrelli suggests that Longanecker get out of there.
- Longanecker requests a water drop in the bottom. The helicopter is directed to the ridgeline instead. Longanecker directs Petrelli to stay in the gully until helicopter returns. Longanecker stays down hill about 200 yards from the bottom.
- 1600 hours The fire crosses west drainage at base of gully below Longanecker. It immediately starts to run for the ridge on west side. Petrelli calls Longanecker to tell him to get out of bottom. Winds become extremely strong.
- 1600 hours Ryerson radios for a second bucket drop on ridgeline. The fire blows up. Blanco directs Mackey to bring firefighters up from bottom.
- 1602 hours Petrelli radios Mackey and tells him that the fire has crossed the canyon and is running. Mackey asks if the fire has crossed main canyon. Petrelli says "yes" and that it's "rolling."
- 1604 hours Kelso calls Shepard and says that they have a spot below them. Blanco directs the hotshots on the ridge and the BLM/Forest Service firefighters to go to Helispot 1 into safety zone.
- 1611 hours Blanco radios Dispatch to report that he is losing the fire on the side towards the homes and needs retardant.
- 1620 hours Air tanker is dispatched.

Events between 1600 and 1624 hours are described separately for the four main groups involved.

1. Jumpers That Deploy Their Fire Shelters Below Helispot

Thomas and Petrelli notice that the fire is in the gully and has crossed to the other side of the main drainage. At about 1610 the jumpers meet Mackey at the lunch spot. Mackey tells them to climb the hill and they will find a good burned safety area below Helispot 1. Petrelli calls Longanecker and tells him to get out of there into the burned area. They last see Mackey as he leaves to check on Longanecker. Mackey tells the other firefighters on the ridge to go to Helispot 1. The jumpers climb the hill to seek an adequate safety zone and to distance themselves from the blowup. The smokejumpers drop their Sigg bottles and saws partway up the hill. Soto has leg cramps and falls behind. Woods stays back with Soto. Woods and Soto deploy their shelters between the upper group and the saws. Six other firefighters (Thomas, Petrelli, Cooper, Feliciano, Shelton, and Rhoades) move up just below Helispot 1 and have time to clear areas and remove their chainsaw chaps. They have difficulty deploying their fire shelters because of winds strong enough to blow their hardhats off. The smokejumpers radio Mackey between 1619 and 1621 hours to report that they are in their shelters. The six smokejumpers at the upper site move into shelters at 1624 hours. They do not remember Mackey's reply. They remain in their shelters for about 1.5 hours until Longanecker arrives at site. Longanecker waits out the fire near lunch spot and does not deploy a shelter.

2. Group on Ridgeline

Half of the Prineville Hotshots, Ryerson's squad, and the two helitack crew members (Tyler and Browning) are on the ridgetop at this time. Byers is working the farthest up the line toward Helispot 1, and the hotshots are all working the spot fire or are nearby. Fire activity is increasing, with several spot fires. Ryerson calls in water drops. At 1604 Blanco gives the order to proceed to Helispot 1. They make it to the big rock just below the burned area when they receive the message that the way up is blocked and they should turn around and go to Helispot 2. Archuleta waits just north of the point where the fireline ties into the ridge, until all the firefighters coming down from Helispot 1 pass him. He then follows them toward Helispot 2. Everyone runs to the red packs, where Blanco and Shepard direct them down the east drainage. This is the last point of contact with Tyler and Browning, who from the ridgeline yell at everyone to go up the ridge. They are told to drop down into the drainage but choose not to.

3. Group on the West Flank

The hotshots and smokejumpers are improving and holding the fireline between the lunch spot and the saddle. Doehring and Archuleta have already worked their way back up the hill with the chainsaw. Erickson arrives at the tree from the bottom and stops there with Haugh. Haugh and Erickson decide to stay until the crew is in view. Erickson can see the fire running up the opposite side of the drainage. As they are waiting, the fire

becomes very active, and crews are directed to move out of the bottom. As the crew comes into view, the fire spots across the drainage to the east side below them in the bottom of the drainage. Erickson radios Mackey between 1614 and 1618 to tell him about the spot fire below him. Erickson takes a picture as the crew comes into view and flames roar over the spur ridge behind the firefighters. He puts his camera around his neck, and Haugh grabs him to go up the hill. From the ridgeline Doebling and Archuleta can see the last two firefighters in line. Reaching the tree where Erickson and Haugh are standing, Thrash says to deploy shelters. Haugh turns and runs to the ridge, followed by Erickson. Haugh reports that the crew is walking briskly but is still in line, carrying equipment and apparently not aware of the closeness of the fire until Erickson radios Mackey that fire has spotted directly below them. Hipke says that they walked quickly when they went up the line until they got to the last steep pitch. Hipke does not deploy because of the density of the fuels. He runs around Roth and Thrash. About halfway up the last pitch he sees Erickson and Haugh telling the firefighters to drop equipment and run. The rest of the crew is 20 to 30 yards behind Hipke. Hipke is running, while trying to remove his shelter from its case. A blast of hot air knocks Hipke to the ground. He thinks the main heat passes over him. Haugh described the main fire cresting the ridge with 200- to 300-foot flame lengths 2 to 3 seconds after he bailed over the top. Hipke dives over the top of the ridge, and Haugh, Erickson, and Hipke run 200 to 300 feet and stop. Erickson and Haugh then attend to Hipke's burned hands. Doebling and Archuleta believe that 30 to 45 seconds elapse between when they take their photo and when the fire crests the ridge. Erickson believes that the spot fire moved from the bottom of the drainage to the top of the ridge in about 30 seconds.

The people that dropped off the ridge to the east take various routes down the drainage. The fire moves down to the mouth of the drainage about 30 to 40 minutes after the last person has escaped.

4. Helitack Crew

The helitack crew (Tyler and Browning) were at Helispot 2 directing helicopter operations. They are last seen going up the hill from Helispot 2. Blanco and Shepard direct them down the east drainage, but they continue up the ridge out of sight, yelling "Run the ridge." That is the last contact with them. Helicopter 93R pilot Good attempts radio contact but receives no answer. Tyler and Browning run the ridge above the jump site. The fire funnels through the saddle at the jump site and cuts off a route to the east. The slope to the northwest looks relatively flat with rock outcrops. The route appears to be the best. Being flanked by the fire, Tyler and Browning head northwest. In 150-200 yards they run into a steep 50-foot-deep rocky chute. Trying to cross the chute, they are caught by the fire in the bottom.

Winslow Robinson assumes the responsibility for managing the South Canyon Fire at about 17:00 hours on July 6. An interagency Incident Management Group manages the fire from 1900 hours until noon on July 7. At this time, Jack Lee's national Type I incident management team assumes management of the fire.



Appendix 5 — Witness Statements

The Investigation Team received statements from people who were directly or indirectly involved in the South Canyon Fire. Some of these witness statements are included in this appendix to give the Board of Review enough information to understand the incident. All statements are included in the South Canyon Fire Accident Investigation Report File, which will be kept at BLM's Colorado State Office in Denver.

The following table lists all who provided statements, their agency if applicable, and their assignment on the fire. Those whose statements are included in this appendix are marked with an asterisk (*).

Any unsigned statement is accompanied by an explanation of why it is not signed, i.e., the witness refused to sign the statement or could not sign it before this report was published. Blackened out portions are corrections made at the witness' request.

	Name	Agency	Incident Assignment
1	1. Abbott, T.	BLM	Firefighter
	2. Andrade, T.	FS	Casualty Team Command
*	3. Arcand, R.	BLM	Acting District Manager
*2	4. Archuleta, S.	FS	Smokejumper
	5. Bidgood, M.	Private Contractor	Pilot Air Tanker T-23
*	6. Blanco, B.	BLM	Incident Commander
	7. Blanton, R.	BLM	Smokejumper Coordinator
*	8. Blume, P.	BLM	Fire Management Officer
	9. Boody, L.	BLM	Assistant District Manager
	10. Brixey, D.	BLM	Firefighter
	11. Brown, C.	FS	Logistics
*	12. Byers, J.	BLM	Firefighter
*	13. Caballero, R.	BLM	Dispatcher
3	14. Cardoza, B.	BLM	Helitack Crew Member
	15. Chambers, D.	FS	Air Attack, 5AK
*4	16. Cheney, F.	BLM	Dispatcher
1	17. Christianson, E.	BLM	Firefighter
5	18. Cook, S.	BLM	Engine Crew Member
6	19. Cooper, M.	FS	Smokejumper
	20. Cross, S.	BLM	Smokejumper Spotter
	21. Dissell, B.	BLM	Helitack Crew Member
*2	22. Doebling, S.	FS	Smokejumper
*	23. Erickson, K.	FS	Smokejumper
6	24. Feliciano, M.	FS	Smokejumper
	25. Ferneau, D.	FS	Air Tactical Group Supervisor
*	26. French, C.	BLM	Dispatcher
*	27. Good, D.	BLM	Pilot, Helicopter 93R

South Canyon Fire

	28.	Grabinski, I.	FS	Dispatcher
^{*1}	29.	Haugh, B.	BLM	Firefighter
^{*1}	30.	Hayes, M.	BLM	Firefighter
[*]	31.	Heffner, P.	BLM	Manager, Western Slope Fire Coordination Center
[*]	32.	Hipke, E.	FS	Smokejumper
	33.	Jarrett, J.	BLM	Firefighter
⁴	34.	LaDou, T.	BLM	Dispatcher
	35.	Lincoln, A.	BLM	Dispatcher
	36.	Linden, M.	BLM	Dispatcher
[*]	37.	Little, S.	FS	Helitack Crew Member
	38.	Longanecker, D.	FS	Smokejumper
[*]	39.	Lotvedt, D.	BLM	Fire Management Officer
[*]	40.	Lowery, M.	FS	Assistant Manager Western Slope Fire Coordination Cntr
⁵	41.	Lucero, M.	BLM	Engine Crew Member
³	42.	Medina, P.	FS	Helitack Crew Member
[*]	43.	Moore, B.	BLM	Colorado State Director
	44.	Moltice, M.	BLM	Area Manager
	45.	Naveaux, C.	FS	Lead Plane Pilot
⁵	46.	Nelson, R.	BLM	Engine Crew Member
	47.	Olshove, D.	FS	Dispatcher
⁷	48.	Paulson, L.	FS	Firefighter
^{*8}	49.	Petrelli, T.	FS	Smokejumper
^{*9}	50.	Prineville	FS	Firefighters
		Interagency Hotshot Crew		
⁸	51.	Rhoades, Q.	FS	Smokejumper
	52.	Robertson, W.	BLM	Fire Control Officer
⁵	53.	Root, D.	BLM	Engine Crew Member
⁷	54.	Rush, B.	FS	Firefighter
	55.	Ryerson, M.	BLM	Squad Boss
	56.	Schroeder, S.	FS	Engine Crew Member
	57.	Shelton, E.	FS	Smokejumper
[*]	58.	Shepard, T.	FS	Hotshot Crew Superintendent
⁵	59.	Shunk, N.	BLM	Firefighter
²	60.	Soto, S.	FS	Smokejumper
	61.	Sullivan, R.	Private Contractor	Pilot, Air Tanker T-127
⁵	62.	Tabor, M.	BLM	Engine Crew Member
	63.	Taft, O.	Private Contractor	Air Attack Pilot, 15VZ
	64.	Temple, J.	Private Citizen	
²	65.	Thomas, B.	FS	Smokejumper
	66.	Tupper, M.	BLM	Smokejumper Spotter
	67.	Voth, K.	BLM	Public Affairs Officer
	68.	White, L.	Carbondale, CO	Tanker Truck Driver
		Volunteer Fire Dept		
⁵	69.	Winter, B.	BLM	Engine Crew Member
²	70.	Woods, K.	FS	Smokejumper

- 1 Abbott, Brixey, Christianson, Hayes, and Haugh were interviewed as a group, and their statements are identical.
- 2 Archuleta, Doebling, Soto, Thomas, and Woods were interviewed as a group, and their statements are identical.
- 3 Cardoza and Medina were interviewed together, and their statements are identical. Medina was also interviewed separately.
- 4 Cheney and LaDou were interviewed together, and their statements are identical.
- 5 Cook, Lucero, Nelson, Root, Tabor, and Winter were interviewed as a group, and their statements are identical.
- 6 Cooper and Feliciano were interviewed together, and their statements are identical.
- 7 Paulson and Rush were interviewed together, and their statements are identical.
- 8 Petrelli and Rhoades were interviewed together.
- 9 Some members of the Prineville Interagency Hotshot Crew chose not to be interviewed individually but did participate in a group interview.

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Arcand, Rich

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Acting DM, BLM, Grand Junction District, Grand Junction, CO

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

Hilton Hotel

Grand Junction, CO

Les Rosenkrance

7/10/94 0900

15. STATEMENT

Rich Arcand

Rich is the Acting BLM Grand Junction District Manager. He has been in this position since April of this year. His regular position is Associate District Manager/Assistant District Manager Resources. Since his position has not been filled during this period he is essentially filling three positions.

Rich indicated that he would provide us with the District organization chart. The District encompasses 2.1 million acres of public lands. As Acting District Manager he is responsible for fire operations in the Grand Junction District as well as all other programs.

District FMO has total discretion to handle fire situations until he no longer can handle it. District Manager establishes priorities between fires within the District. Prioritization is based upon Resource Management plans and District fire suppression plans, which includes initial attack procedures and identifies priority areas. The District does follow a Dispatch Plan for sending resources to fires. (This plan is available and will be provided.) Each morning local area network notifies all offices in the District about fire activities.

Rich has some fire experience and has received training in Incident Command Systems, Fire Weather, Basic Fire Fighter, liaison, etc. He has also attended Fire Management for Managers in 1985 or 1986.

I have read the foregoing statement consisting of 3 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Richard Arcand (corrections noted on page 4)

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/10/94 1000

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Arcand, Rich

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Recognizes that there is some conflict between District and Western Slope Fire Operations. Feels they are completely separate operations. Western Slope answers directly to the State Fire Management Officer. District used to have its own initial attack helitack crew. Budget and FTE reductions lead to the elimination of that ship. Some years, use of the Western Slope helicopter is OK, but a year like this one, it really reduces our fire fighting effectiveness. The District must rely on the Western slope helitack crew for initial attack, but that crew can be dispatched to a fire outside the District without notice, leaving the Grand Junction District without that capability.

Prior to July 6 there were numerous fires throughout their District. Several large fires were our highest priority. (Daily situation reports will be made available to the investigation team.)

South Canyon Fire was a lower priority due to fuel and predicted low rate of spread. Felt this fire could wait for additional resources. No other resources available.

7/4/94

Rich held a District Management Team meeting where the high fire danger was discussed. Due to limited fire fighting resources, all fires were to be initial attacked and put out as soon as resources were available. Did not want to tie up

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I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Richard Arcand (Corrections noted on page 4)

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Arcand, Rich

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

resources on extended fires. That's why South Canyon Fire was initial attacked on 7/5.

Escaped Fire Analysis was not done until after the 7/6 blow-up because it was just then being initial attacked. This was prepared by the District FMO at that time so it could be given to the IC team that was to takeover the fire.

Had high regard for Mitch Blanco's abilities as a fire fighter and IC.

7/5/94

Signed memo that due to a high fire danger that all employees were subject to be called to support fire operations.

7/6/94

At time of "blow-up" of South Canyon Fire, Rich was at a friend's house. He did not learn of the casualties until about 8:45 p.m. when he received a call from his staff. He made the decision to bring in the class I IC. Designated Mike Mottice as Resource Advisor to IC. Left office at about 2:00 a.m. on 7/7. He had no indication prior to 7/6 that this fire had much potential. He was always told that the fuels in that area were sparse.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Richard Arcand (corrections noted on page 4)
SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

CORRECTION AND CLARIFICATIONS OF STATEMENT WITH REGARD TO SOUTH CANYON FIRE

Page 1 of 3; Third Paragraph: The District FMO has total discretion to handle initial attack and suppression activities and strategies within the guidelines of the Resource Management Plans and District Fire Management Activity Plan with resources assigned to the District. The statement "until he no longer can handle it" is misleading. The resources available at the District level is the critical factor that determines whether a fire can be "handled" or not. Before initial attack and suppression capability are beyond the scope of the District's resources the FMO is encouraged and expected to request outside assistance through the fire dispatch centers. The District Manager establishes priorities between fires within the District via the Resource Management Plan and District Fire Activity Plan by identification of fire management zones and respective responses required. The District Manager relies on the FMO to utilize these documents to determine strategy and priority on a daily operational level. Copies of pertinent parts of the Resource Management Plan for Glenwood Springs and the District Fire Management Activity Plan were provided to the team.

Page 1 of 3; last paragraph: Fire Management for Managers training course was taken and completed in May 1990. Copy of SF-182, Certification of training was provided to the Team.

Page 2 of 3; 7/4/94: I did not hold a District Management Team on 7/4/95 as specified in this statement. The meeting/discussion referenced was on June 14 and 15, 1994 with the Area Managers and Assistant District Manager for Support Services. A copy of the Local Area Network (LAN) memo on this matter was provided to the team.

Page 3 of 3; 7/5/94: A memo was not signed as indicated. The message to "all employees" was via the Local Area Network (LAN) which identifies sender, day and time for verification of automated records. A copy of the LAN message was provide to the Team.

Page 3 of 3; 7/6/94; last sentence: I was not told that the fuels in the area were sparse. I told the Investigating team that on the morning of 7/5/94 I personally observed the fire from the Interstate on my way to Glenwood Springs for a meeting. At that time I observed that the fire was currently burning in sparse fuels with low rate of spread.

I have read the foregoing statement consisting of 3 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge with the above corrections and additions noted. I make this statement freely and voluntarily, without threats or rewards, or promises of reward have been made to me in return for it.

Richard Arcand
Signature of Person Giving Statement

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Blanco, Butch

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Firefighter, BLM, Grand Junction CO, Grand Junction, CO

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

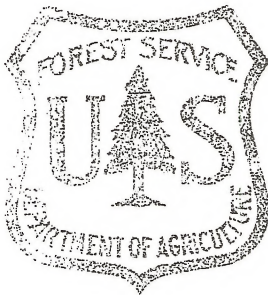
Glenwood Springs, CO

Roy Johnson, & Sue Husari

7/9/94 0800

15. STATEMENT

(Attached Personal Statement)



I have read the foregoing statement consisting of 5 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

James R. Blanco
SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/9/94 0900

17. OFFICER'S SIGNATURE

Sue Husari

18. WITNESS SIGNATURE (If Applicable)

Interview with Butch Blanco:

7/4 I left the Copper Spur fire and drove to the South Canyon fire. I met with Sam Schroeder. He returned to the road from the canyon to the west of the fire. We talked and decided to wait until morning and then take action on the South Canyon fire. I met up with Jim Byers, Mike Hayes, the Canyon City engine crew and Michelle Ryerson and her crew. We went to the District Office to prepare the initial attack equipment for the next morning.

7/5 We hiked in up east drainage & cut H1. One saw broke down. I was working with the crew as they started down the west side from the helispot cutting direct fireline. The second chainsaw broke down. There were two retardant drops on 7/5. One was a good drop along the handling. The second was a drop on the fire above the highway. The air tanker pilot did not like dropping on this fire. I did not ask for more drops because of rolling rocks on the I70 side. Also, retardant is not effective without the people to support it.

Then the smoke jumpers came in up north of H2. I set up radio communication with Mackey on the BLM work channel, and advised him that crews has begun handline construction. I advised Mackey that the BLM crew would head out and left. I did not meet with Mackey physically on July 5. I knew that Mackey would look at fire from the air before they jumped and that he would make a decision on what to do with it after we left. I did not feel that smokejumpers needed additional guidance. Mackey informed me that the line we had cut during the day was lost via radio.

In summary, the fire was creeping and 20-30 acres on this date. I came back to office to repair saws and stayed till 2230. We geared up to go back to the fire and spike out until the fire was out. I called Dispatch and talked to Pete. Pete said there would be a helicopter & shot crew on the fire the next day ordered for 0600. I had an order in for 2 type II crews. The smokejumpers asked for a type I crew. I told dispatch that I needed people and air support.

7/6 We hiked back in. We had left J. Jerret down at the bottom since her foot was hurt. I think she drove some of us to the fire & returned to the BLM office. I had 5 more people than the day before. I met Mackey. I talked about extending line off helispot 1 at 0830 or 0900. The smokejumpers had built a line from H1 to H2 at night. They had worked on the East side, but had pulled out because of rolling material the night of 7/5 sometime.

Mackey and I discussed widening the line using the BLM crew. I directed the BLM crew to widen the fireline between H1 and H2.

Rich Tyler, Don Mackey and I took a recon flight of the fire from H1, on the way to the helibase I asked Rich Tyler what he thought of strategy. I talked to Mackey about the strategy. About an hour + later I flew the fire again with Mackey and Tyler. We got back and the new helispot was complete (H2). The pilot did not like the first helispot. Mackey liked the direct strategy instead of indirect. Mackey flagged a line location dropping off the west side and going direct to the west. The smokejumpers started constructing the line down the hill. Mackey and I decided to split the hotshot crew and take the first group down the hill. I talked to Shepard (Hotshot superintendent). I asked if he was O.K. to put 1/2 of his crew with jumpers & 1/2 of his crew on the ridge. I talked to Shepard and walked from H2 to H1. Shepard and I talked about going direct and indirect on east side as a future action. We had a conference at the drop off point. The decision was made to go direct.

I listened to the weather forecast NOAA with Mackey and Shepard. I remember that there would be winds or a frontal passage. It was a typical weather forecast. The jumpers punched the weather frequency into their radios. Dispatch indicated that out of the ordinary weather conditions were expected. No on site weather was taken. There was no indication that a spot weather forecast was needed.

The second half of the hotshot crew arrived. Mackey and the smokejumpers were already working down the hill. Mackey requested another saw team and I sent Haugh and Brixey.

Tom Shepard asked me what the fuel moistures were. I didn't know, but said that the fuel moistures were probably low. I said that it was a dry season with big fires.

Shepard, Tyler, Browning, and I were standing above the red bags near two trees at a location where we could see the drainage. We could see Mackey's crew working the bottom and Haugh and Brixey working near the upper part of the line.

The helicopter did bucket work.

Other half of the hotshot crew started widening the line up on the ridgeline. They started working behind Ryerson. They were going to work from where Byers was to H1.

Mackey kept asking the pilot to look at parts of fire he couldn't see from his location. The water source was directly NW. When the pilot was incoming he had a view of the scene. I did not hear any transmission between them that indicated problems.

I called dispatch and told them that things looked good.

Two helicopter bucket drops came in just before the fire blew up. When the first bucket drop came in, somebody said, "No go ahead and take it" on the radio from down below (Mackey or Longnecker). Pilot said - Mitchell, how's it looking, "I'll be right back." Mackey was asking the pilot, "What's it's look like up there" while 93R was returning for the last drop.

I was with Rich, Tom & Robert during the last water drop. We were looking down and moving towards the water drop carrying cubitainers for the jumpers down below. As the second drop was approaching it just happened. I did not hear anything about a spot fire on my radio. Tom or Rich saw that the fire was active and blowing up. I couldn't see well from my location because of the trees on the ridgeline. I was with Tom Shepard, Rich and Robert. I used the radio work channel and started hollering for people to get out. Tom directed the Hotshots to get out. Some of the hotshots were with Mackey and jumpers at the bottom of the line. I directed BLM to go to H1. They couldn't do it because the fire would cut them off. Michelle said on the radio that they couldn't get to H1 so I think I told them to turn back. They turned back and they all ran through the saddle below H2. Tom Shepard and I threw the red bags into a depression. I told each person to go down the drainage.

Tyler and Browning went up instead. I hollered at them to go down the drainage.

Some of the smokejumpers came out from down the line where Mackey and the jumpers and some of the hotshots were working. All were directed into the drainage. After I dropped into the drainage I ran into the two burned jumpers. I hung around & waited to see if more people came off the hill.

During all this I notified dispatch of the situation and called for more backup (structure protection, tankers) and EMS.

Emergency services were waiting at the mouth of the canyon when we exited. I began accounting for people in the drainage as soon as we got to the bottom. I drove to the helibase with Brian Schotz and Sarah (?) from the jumpers to complete the list.

I confirmed with Winslow Robertson a list of the missing and the people who had made it out.

I went to the BLM office to check in with the crews there then went to the hospital to confirm names of those taken to the hospital.

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Blanton, Rick

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Smokejumper Coordinator, BLM, Grand Junction, CO

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Western Slope
Fire Center

13. NAME OF OFFICER TAKING STATEMENT

John H. Graber

14. DATE/TIME STARTED

7/8/94 1600

15. STATEMENT

7/6/94

Briefed smokejumpers about weather conditions in morning.

(See attached personal statement)



I have read the foregoing statement consisting of 1 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

A handwritten signature in cursive script that reads "Rick Blanton".

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/8/94 1615

17. OFFICER'S SIGNATURE

A handwritten signature in cursive script that reads "John H. Graber".

18. WITNESS SIGNATURE (If Applicable)

DATE: July 21, 1994
TO: Investigation Team, South Canyon Incident
FROM: Rick Blanton

My primary role before, during and after the South Canyon Incident has been smokejumper coordinator for Grand Junction smokejumper operations. I also flew several ATGS missions prior to the incident. During this period the Rocky Mountain Area has experienced extreme fire behavior including rapid rate of spread and long spotting distances.

On the morning of July 5, 1994 an order for additional smokejumpers to WSFCC (Western Slope Fire Coordination Center) was processed and filled. The smokejumper booster came out of Santa Fe, New Mexico. By approximately 1515 hrs. eight of the seventeen smokejumpers ordered arrived via Casa 117BH on the WSFCC ramp. An outstanding jump request for the South Canyon Incident awaited this first group of jumpers. After jump gear had been readied and a short briefing completed these jumpers boarded jumpship 490AS and jumped the South Canyon Incident. The briefing that the jumpers had prior to suiting up for the fire included a burning conditions update identifying that both 1000 hr. and live fuel moistures were several weeks ahead of where they should be.

The second group of 9 jumpers from Santa Fe arrived in Grand Junction at approximately 2200 hrs. This group was also given a briefing which included current burning condition information as well as a forecast for high winds for the following day which were predicted to arrive in the area sometime after 1400 hrs. The forecasted wind information had been passed on to me earlier in the evening by the WSFCC assigned meteorologist.

Sometime between the dropping of the first group of jumpers from Santa Fe on the South Canyon Incident and the arrival of the second group into Grand Junction, twenty jumpers demobed from fires back into WSFCC. At approximately 0620 on the morning of July 6, eight of these twenty jumpers departed Grand Junction to jump the Burn Incident.

At approximately 1000 hrs. on the morning of the July 6, a jump request for the South Canyon Incident came across the WSFCC aircraft desk. The jumpers that filled this request included Hipke, Thomas, Petrilli, Longanecker, Cooper, Feliciano, Roth, and Thrash.

At approximately 1400 hrs. on the same day, 28 smokejumpers departed WSFCC via bus for a crew action on the South Canyon Incident. Forecasted high winds had arrived ahead of schedule at approximately 1300 hrs.

Rick Blanton

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Blume, Pete

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

FMO, BLM, Grand Junction District, Grand Junction, CO

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Hilton Hotel
Grand Junction, CO

13. NAME OF OFFICER TAKING STATEMENT

Les Rosenkrance

14. DATE/TIME STARTED

7/10/94 1300

15. STATEMENT

(includes attached Chronology by Pete)

Pete BlumeGrand Junction BLM District FMO
303-244-3050

Grand Junction does have a fire mobilization plan that was updated in 1994. Earlier this year the District Manager (mid June) held a management team meeting. Fire conditions were discussed and the decision made that all fires should ~~be~~ **RELEASE FULL** suppression/control. ~~As the appropriate suppression response~~ **APB** to keep them small. The District did not have the resources to deal with a lot of extended fires.

7/2/94

About 1800 the District had several severe thunderstorms move through the area. More storms on Sunday 7/3 and Monday 7/4. This resulted in about 750 new fires at the same time.

7/3/94 **SHEEP MTN, HOUR GLASS, & SQUAW MTN**

The ~~fires~~ **fires** ignited ~~threatening~~ **threatening** homes, and ~~was~~ **was** ~~were~~ **were** really rolling. These became the ~~priority~~ **priority** in the AREA. In addition, the Grand Junction District had two fires with a lot of potential and growing rapidly. These were the Colbert Flats Fire at 180 acres and the Sunnyside Fire that

I have read the foregoing statement consisting of 6 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Pete P. Blume

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/10/94 1430

17. OFFICER'S SIGNATURE

Les Rosenkrance

18. WITNESS' SIGNATURE (If Applicable)

CHRONOLOGY OF OFF-SITE EVENTS
PRIOR TO SOUTH CANYON FIRE DISASTER
AS RECALLED BY ROBERT P. BLUME, DFMO

- 6/27 - Monday:
Hart's Type II Incident Management Team assumes command of Buniger Fire (1600 acres).
- 6/28 - Tuesday:
Interagency coordination to establish Fire Restrictions.
Statewide Multi-Agency restrictions effective by Friday, 7/1.
- 6/29 - Wednesday:
Long Canyon Fire (620 acres) begins and is added to Hart's Team at Buniger Incident.
- 6/30 - Thursday:
Battlement Mesa Fire (approx 500 acres) begins. Aggressive Initial Attack by Grand Junction BLM. Fire ultimately held to private lands. Adams' Type II Incident Management Team assumes fire 7/1 a.m.
- 7/1 - Friday:
More Severity engines arrive.
- 7/2 - Saturday:
First Major Lightning Bust. At least 22 known fire starts. Copper Spur most significant. Threatened structures at McCoy Colorado. Turned over to Craig BLM jurisdiction after I.A.
- 7/3 - Sunday:
District takes Long Canyon/Buniger back from Hart's Team. Colbert Flats (160 acres) and Sunnyside (80 acres) Fires take off. Second Lightning Bust with total of over 45 known fires on District for 7/3 - 7/4. District Radio System inadequate for amount of fire and aviation traffic. Available Initial Attack resources being restricted to running fires or those with imminent threat to life and/or property.

First report of South Canyon Fire. Initially reported as fire on private land. Size-up by District I.A. engine (Clay Fowler) recommends monitor because of limited spread potential and threat to improvements. Fire reassessed by Winslow Robertson (AFMO), concurrence on monitor.

RPB

Management Actions: Advised State AFMO (Paul Hefner) of problems with radio frequency congestion and workload of multiple starts. Late P.M., called in IC and Ops Chief from Hart's team to discuss possibility of assigning geographic area to them for control and Initial Attack of fires within the zone. Intent to split workload and get radio traffic onto another frequency/system. IC doesn't feel it's necessary. Called Asst. Area Coordinator (Chris Fletcher) to get Regional perspective on committing Type II Team to this kind of assignment. OK with her. Decided to give it one more day.

7/4 - Monday:

Close-out with Hart's Team in a.m. Pyramid Rock (approx. 180 acres, threatening ranch house and outbuildings) and Horse Thief III (approx. 600 acres, threatening Interstate Power Transmission Lines) take-off.

South Canyon Fire in monitor status. Approx. 1545, fire re-assessed by Sopris Zone FMO. No immediate threat to structures, will make do with available resources. Fire estimated at 5-10 acres at 1900 hrs. by Air Patrol. Approx. 2100, Dispatch took call from concerned homeowner that fire was moving aggressively downhill. Blume called Garfield County Sheriff's Office and requested size-up. Garfield County reported back no change in fire activity.

Management Actions: Reassigned Communications Technician from Hart's Long Team to District to develop options for another radio frequency to relieve congestion on District Frequency. Very helpful, but NICC Radio Shop won't release equipment for this purpose. Ordered Type II Incident Management Team in order to zone fire workload. Hart's Team already re-assigned to Wake Fire (MRD). Wake Fire became number one Rocky Mountain Area/Western Slope Zone priority for scarce resources, due to imminent threat to homes. New team coming from R-1.

7/5 - Tuesday:

First Ground Forces on South Canyon. A.M.: Engine 675 (3 persons) Ryerson Squad (5 persons). Fire requests reassignment of Engine 651 (Abbott) and Byers/Hayes from Copper Spur Fire. Assigned upon release. Fire gets two loads of retardant. Fire requests Helicopter and two type II crews. WSC gives us H-93R for 7/6 only. P.M.: Load of Smokejumpers (Mackey). Mackey requests two Type I crews for 7/6. First crew filled with Prineville IHC for 7/6 A.M.

Management Actions: Turned over Pyramid Complex/Debeque Zone to Stone's Type II Incident Management Team. Worked with WSCC to acquire helicopter priority for South Canyon. Hunter Canyon Fire (approx. 100+ acres) takes off. Initial Attack by GJD, turned over to Pyramid Complex for 7/6.

RPB

7/6 - Wednesday:

South Canyon Fire: Second load of jumpers, Helicopter 93R, and Prineville Hotshots arrive on scene.

Management Actions: Worked with SAFMO (Paul Hefner) to get resources for fire. Due to availability of a large number of smokejumpers and forecast high winds, 30 smokejumpers were assigned and planned for ground transport to fire. ETA mid-afternoon.

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Byers, Jim

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Firefighter, BLM, Glenwood Springs District, Glenwood Springs, CO

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Glenwood Springs Area

13. NAME OF OFFICER TAKING STATEMENT

Paul Werth, Sue Husari,
~~& Paul Johnson~~

14. DATE/TIME STARTED

7/18/94 0900-11:00

15. STATEMENT

Rory

(see attached statement)


 ONLY WITH THE NOTES
 CORRECTIONS

I have read the foregoing statement consisting of 3 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 James C. Byers
 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7-31-94

17. OFFICER'S SIGNATURE

Sue Husari

18. WITNESS' SIGNATURE (If Applicable)

COLLECTED in 5
MADZ
James C. Byers, S.

WITNESS STATEMENT: JIM BYERS
BLM GLENWOOD SPRINGS

7/6/94

I arrived at the area office and ^{helped load gear into trucks} while I waited for Michelle and Butch to get their things together. We walked up to H2. Michelle Ryerson gave us the assignment to go from H2 to H1 and to widen the scratch line to twenty feet wide.

The fire activity on the ridgeline was quiet. Around noon Mackey came up to me and said "The fire is starting to push the line up ahead". He asked the crew to go up ahead and help. I called Michelle Ryerson to ask and got no reply. I called Haugh and went up ahead to help on the hot area. I finally got a hold of Michelle and told her. When everyone arrived there was a flare up in a cedar, which the smokejumpers plus the BLM squad isolated and took care of it.

I was ^{squad's} informed of the ^{as I was assigned as a sampler.} tactics on the fire. Mackey asked for another saw down the hill. One of the jumpers asked me to go down the hill. Ryerson and Blanco both said no. They asked ^{Michelle's} me to work the ridge line on the way up to H1. I walked up the ridge toward H1 and found ^{an area w/ heavy fuels} that needed to be cut & cleared. I spent an hour working the spot at the hook in the line the underbrush was smoking. The Prineville hot shot ^{team} began to arrive in the area. There was no fire yet & this area had a burn strip from earlier. One went along the line. My crew continued to widen line towards H1.

It took a long time to get the hot shots into the fire. The pilot of 93R ^{seemed} was ^{prone to} forgettable, he had to keep switching from shuttle missions to buckets. It took till 1400 hrs until the whole crew made it up to the fire to cargo it.

Took our first break at 1530 hrs after we had finished brushing out the fire 20 feet wide. While we were sitting there the winds were calm est 5 mph. Out of habit ^{we} started asking each other what would ^{if things go bad, where is the escape route?} Back Towards H2 if things hit the fan down into the drainage. H1 not being considered as a safety zone because I had never really seen it. Fire activity was quiet consisted of duffers burning under the oak brush. It was very smoky. There was really no change in fire activity no flare ups! One of the guys said there was a flare-up, the Oak brush burst into flames and jumped the line, and started building line in the slash, helped Michelle and her people line and isolate the slope over.

Michelle called for a bucket drop, and 93R missed on the drop. The winds ^{started} to kick up. 93R had to approach from the east because the winds were picking up. The increase in the winds caused the flare-up and caused us to basically lose the spot fire. The Hot Shot crew was working down below and were able to help us. At this point the radio traffic indicated that the people down below ^{needed} need of bucket support, Longanecker and Mackey were talking on the BLM tactical channel and were saying ^{that things were heating up down there.} approximately 1600-1615 hrs. I told Michelle that the people down below ^{would need} needed bucket support and Michelle said she needed one more bucket, she was asking who had priority. 93R brought one more bucket up to Michelle's spot. Right after the second bucket drop on Michelle's spot all hell broke loose.

^{Michelle checked w/ Mackey and he indicated that he did not need bucket support.} assigned by Blanco. I think he was off getting another bucket of water. I don't remember any radio communications with the pilot of 93R. At this time I remember all of us heading up to H1 because it was our safety zone, about 200 hundred feet from the top we got cut off and turned around. After we turned around and headed back down things seem to go into slow motion. The fact that anyone got out of there is amazing. ^{Archuleta} the guy with the orange hat was standing at the ^{2 hand times} junction of the and directing everyone to get out and down the canyon to I-70.

the ridge to H2

and follow our hike route that A.M.

Michelle checked w/ Mackey and he indicated that he did not need bucket support.

At the pole of red logs
near H2, fine
hot shots

In less
than 30
seconds

Tenn said to pull out our shelters, thought I saw fire on the east side of the ridge, every one went down the east drainage. ~~Eric, Derek, Brixey and myself went out with the~~ some of the hot shots. Hooked up with Fico and Prineville wanted to stay to see what happened to the rest of their crew. Had seen the fire front hitting the top of the ridge ~~hitting~~ with the hot shots so that we could show them the way and knew not all the crew had not made it out. Never did see or talk to the two helitack people. Feel that the blowup was caused by a sudden increase in the wind. No clouds or cumulus buildup was evident to me at the time of the blowup.

COLLECTIONS
MADE
James C. Byers

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Cross, Sean

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Smokey Mountain Station

Pilot, BLM, NIFC, Boise, ID

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

FAX

13. NAME OF OFFICER TAKING STATEMENT

Mike Clarkson

14. DATE/TIME STARTED

7/15/94

15. STATEMENT

(see attached personal statement)



I have read the foregoing statement consisting of 3 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Ross C. Cross 7-27-94

SIGNATURE OF PERSON GIVING STATEMENT

 16. DATE/TIME ENDED
 (time faxed)
 7/15/94 1833

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

South Canyon Fire
Cross, Sean

Page 2 of 3

53

Narrative statement of smokejumper operations on 7-5-94, fire V-891, by Sean Cross, smokejumper spotter.

At 1722 hours on 7-5-94 I departed the Grand Junction airport as the smokejumper spotter on BLM jumpship N490AS (DHC-6 Twin Otter) to Grand Junction BLM district fire V-891. On board were eight smokejumpers, one spotter, and one pilot (Kevin Stalder). We carried 3.5 hours of fuel. ETE to the fire was 25 minutes.

Twenty minutes out from the fire, Stalder and I spoke to the pilot of Tanker 127 on VHF 122.925. T127 was inbound to GJT after dropping retardant on fire V-891. He told us that terrain was steep at the fire, that he was doubtful as to the effectiveness of the retardant due to that, and that we might have a hard time finding a place to drop jumpers. We thanked him for the information. I told Kevin that if we couldn't find a suitable place to drop the jumpers we could suggest landing at the Glenwood airport so that the jumpers could reach the fire by ground.

Ten minutes out from the fire I established radio contact with fire IC Butch Blanco. I learned from him that he had 15 firefighters on the fire, that the fire was not rolling or posing too much of a problem at that time, but that both the chainsaws he had were down indefinitely. He said he could use the eight jumpers if we could find a place to drop them. I told Blanco I would raise him once we were over the fire.

At 1745 490AS arrived over the fire. The fire was 20 - 30 acres, there was almost no wind on it, and it seemed to be backing down slowly into the drainages on the E and W sides, and down the spur ridge that ran to the SW off the main knob that the fire was on. After about six passes around the area at about 1500 feet AGL above the fire, Stalder and I determined that we could put the jumpers into a saddle on the same ridgeline as the fire about 1/4 to 1/2 mile N if the wind conditions were satisfactory. We had only one pattern choice due to terrain considerations, but we felt that it would be sufficient for both jumpers and cargo. I briefed Blanco on what we were going to attempt, and after clearing it with Grand Junction dispatch went to the back of the plane to begin smokejumper operations.

In the back of the plane, I asked Stalder for a 500 feet AGL observation pass. I used this to determine whether there was turbulence near the ground and to look over the jump spot with Mackey, who was first in the door. To further reconfirm that Mackey and I were looking at the same jumpspot we made a second pass at 500 feet.

After climbing to 1500 feet, initial streamers showed that we would need to fly a downwind (nonstandard) pattern. Check streamers indicated that the winds were very light. Smoke from the fire, which was rising straight up then drifting slightly to the West also indicated light winds.

Sean C. Cross 7-27-94

South Canyon Fire
Cross, Sean

Page 3 of 3

Mackey and I decided the conditions were acceptable, and after one pass to hook up Mackey and Doehring and give them a prejump briefing, they exited the plane. Mackey landed exactly where we had planned and Doehring, though slightly long, was right in the ballpark. I had told Mackey that I would wait to hear from him on the jumper air/ground FM frequency before dropping the rest of the jumpers. He called me shortly after hitting the ground and confirmed that the spot and conditions were acceptable. He told me there was hardly any wind on the ground but that the jumpers should hold up high. Mackey said that the exit point was acceptable. I relayed this information to the subsequent sticks during their prejump briefings. The remaining six jumpers reached the ground safely and in the general area of the selected jumpspot.

Cargo operations took six passes and went smoothly, and by 1840 hours all the jumpers and cargo were on the ground.

Stalder climbed to 1500 feet and continued to circle the area as I waited for Mackey to establish contact with Blanco on the BLM FM frequency. Mackey's radio was giving him difficulty as he was trying to program the new frequency, so I asked Blanco if he could raise Mackey on the jumper air/ground frequency, which he did almost immediately. As soon as contact was established Mackey and Blanco immediately began talking about how to put out the fire.

It was determined that Mackey's crew would head up the ridge to the fireline and begin cutting direct line to the right, or West, toward Blanco's crew. Blanco reminded me that both his saws were out of commission and that he would be pulling his crew out, but that they would be back in the morning. I told him that I thought Mackey's crew should be able to make excellent progress by morning. I told Blanco that I thought the fire looked like it could be caught, but that it could become a problem if it got into the drainage bottoms.

At this time the fire appeared fairly calm. There was almost no wind on it, and no active flame that I could see from the air. The fire was backing down slowly into the drainages, and although the terrain was steep and the brush heavy in places, I thought it could be caught.

I contacted Mackey and Blanco and told them that 490AS was leaving the area. I contacted Grand Junction dispatch, gave them an update of the jumper status on the fire, and headed back to Grand Junction.

Sean C. Cross 7-27-94

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Erickson, Kevin

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Smokejumper, FS, Region 1, Missoula, MT

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN
Hilton Hotel
Grand Junction, CO13. NAME OF OFFICER TAKING STATEMENT
George Jackson, Sue Husari
& Mike Clarkston

14. DATE/TIME STARTED

7/18/94 1300

15. STATEMENT

(see attached personal statement)



I have read the foregoing statement consisting of 4 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

Kevin O. Erickson

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/18/94 1500

17. OFFICER'S SIGNATURE

Mike Clarkston

18. WITNESS' SIGNATURE (If Applicable)

Kevin Erickson

~~Kevin Erickson~~
Kevin Erickson
8-9-94

Interview

We flew from Santa Fe to Grand Junction. I was in the group of 14 jumpers with Wayne Cook. I was at the bottom of the load. I [redacted] went instead of C. Robinson. I got off the plane, boarded another and flew immediately to fire. We [redacted] the saddle. We got our stuff. We headed up hill. We arrived at H1 just after BLM left. Their saws were broken. I didnt talk to them. I am not sure if Don had contact with Blanco or not via radio. Blanco planned to hike back up in the morning. We went to the helispot and decided to cut down off the east side at night. We followed the fire edge and after working for awhile we decided to head back up to the top. We were working down in chutes. It was steep, with rolling rocks and dangerous at night. We tried cup trenching but could not hold the line. We came back up to the helispot. [redacted]

[redacted]. We got back to the top at about 2400. (guess). We ate, talked and tried to sleep but it was windy and cold and no one could really sleep. At first light we got something to eat and put a line down the ridge to H2. The fire was flaring up [redacted] *Seagrass, ca. 1/2* below in the brush on the west side. We dug and cut line through the saddles and then about 0830 or 0900 we headed across to get the gear out of trees. I figured if it blew it would run through the saddle where the gear was. We sacked up the gear and brought down. Blanco and his crew showed up. We went past them to work [redacted] them brushing out the ridge. Don went up in a helicopter to recon. He radiod to see if we wanted to go start cutting line down the hill. I thought it looked ugly down in there. He said it was sparse in the bottom and we could probably get away with it. There were some sparse areas in the bottom. [redacted] Mackey and I took a little walk down the hill. We looked at the area. While we were down the hill a tree about 40 yards down from the top. It started a little run about 5 feet wide to the top. This started a spotfire on the ridgeline. The smokejumpers [redacted] *a district crew* worked the spotfire.

The other jumpers arrived. Longnecker was out front scouting. They were opening up a 6 or 7 foot wide line. There was a 16 to 18 inch scrape. 150 to 200 feet down the hill the hotshots arrived in behind. Hot shots come in about 1200. They went direct. Good breeze. Oakbrush dried out from underburn. It looked good for a reburn. There were no real good safe areas. Tried to pack black with it. The ground fuels burned clean. At was kind of cloudy all day. This helped and kept the temperature down. The line construction was not tough. At 1500 he sat down and ate on the north side with Doring [redacted]. Roth had dropped back to

8-9-94

stop at the felled tree. A couple of hotshots went back to saw the tree. Doring, Erickson, Cooper, Feliciano and Thrash worked on the cup trench started by the hotshots. At about 1630 Mackey came down to the bottom and Thrash, Feliciano and Cooper went on and left Erickson, Doring and Kelso. Someone bumped down water from the top. Mackey took one of the cubitainers on down to the hotshot crew and told me and Dohring to check the line. We were looking for hot rolling material [redacted] across the line. Roth had the cubitainer. I asked if I should take it back to Hotshots. I volunteered but Roth said he would do it. I met Haugh and Brixey at the tree. Archulata came down the hill. At this time the column picked up and there was more radio traffic. The traffic was about fire activity here and there. We weren't too worried about it. Then Sara walked up the hill [redacted] to meet Archalata on the top. Brixey walked up the hill. Brad stayed at the tree. I asked him about brush. Brad said it burned hot. I could see the column really pick up. Lets get [redacted] crews out of here type of stuff on the radio. A few minutes later you could see fire jump to opposite side both to north and uphill. Haugh and I decided to stay to see if [redacted] could help the people coming up the hill. The fire went to the north on the opposite side. The fire spotted on the west side directly below the line at the bottom of the drainage. The spot grew quickly and I could see hardhats above it. The spot moved fast. I did not feel a perceptible change in winds. I could tell that they were moving as fast as they could. At that time the lead guy and the group were 75 yards away. We were yelling at them to go faster. They looked tired and weren't going fast. Thrash was in the lead and Mackey was second to the last. They were in a close group. At this time I asked Haugh pull out my camera. I took a picture. I saw them through the viewfinder with fire everywhere behind them. As I took the picture Haugh grabbed me and turned me around. I took one more look back and saw a wall of fire coming up hill. I ran for the top and made it over the top of hill. I got off the back side. I heard them yell a few times. Then it was quiet except for the fire. They went fast. I fell on top of Brad. It was hot up on top. I ran into Hipke as he came stumbling back from the right. We bandaged up hands. I asked Haugh about shelters. I thought it might spot below and he said he been down the drainage before. He said that the drainage exited at the highway. I followed him out and kept talking to Eric to keep from going into shock.

I sensed that they felt they were in trouble just when it spotted underneath them. The spot was just barely off the bottom of the drainage. I ran up hill as hard as I could.

Other comments:

I didn't like going down in there. I talked to Mackey about it. Not burning too active. [redacted] I was going by his judgement, His best

I thought that was the best way also
judgement was to go direct. [redacted]
[redacted] He said that he didn't know who the IC was, him or Blanco. He asked me if I wanted it. I said yes. He just smiled at me and said "We'll see what happens.". He had a pulaski with him. He did some work on the line but mostly talking and then looking.

Longnecker was scouting out ahead.

Early that morning there was a weather forecast but I didn't listen to. it. I gathered that there was a cold front. No time given. I attributed the winds to the cold front. I talked to Don about that before we started building line. I thought the cold front had passed and these were the winds that were following it. Don may have thought the same thing. I didnt expect the cold front to have a major change in temperatures.

When the spot started I radioed Mackey that there was a spot below him It was probably not more than 30 seconds after spot started that it made it up to the top.

Main fire went to the north and slipped across the bottom. It was close across the draw. The flame lengths [redacted]
[redacted] curled over the top and were 150 feet high or more.

[redacted] Did not know who the IC was until I ran into him in the drainage on the way out. Blanco never came down the fireline.

I still have my fire clothes. The shirt has burn holes and scorch on it. Ted Putnam can get my pg bag down at Grand Junction. I will send the shirt and pants.

The crew when I saw them were moving out fast but not running. I called and told them that it was right below them. The fire was probably not chasing them on their side. I did not realize how much trouble they were in until it hit them.

Advice for us:

I have been in this situation before with unburned fuel below. Only other choice was to go indirect. I had never been in that type of fuel before. I know chaparral. This brush didnt look so bad because it was a surface fire. I didnt think it would burn because it was so green.

I don't know if know if Don knew about the fingers in the drainage.

The spot was straight down the hill and north ^{maybe} 60 yards from the tree Rhodes felled. It was in the bottom. It was right across the hill.

Kevin O Erickson
8-9-94

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Dick Good ^{Seasoning FIRE} Pilot 93R

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

414 Allen Ave

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Pilot

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Written to his Home via
Phone.

13. NAME OF OFFICER TAKING STATEMENT

Sam Webb, Mike Clarkson,
Paul Wirth, Sue Husarik

14. DATE/TIME STARTED

7/11/94 1330

15. STATEMENT

Landed & Flew Recon Flight w/ Macky & Blasco.
Discussed line location. ~~Then~~ Decided to go ahead. Direct
Did Bucket work then hauled Pineville 2 loads
5/lead Folks. Switched to Bucket Drops & moved rest
of Hotshots up. Moved 2 single loads Cargo &
Did 3 bucket loads for Michelle Beyerson.
FIRE Really Blew @ time of third Drop.
Lots of Turbulence gradually increasing but
from consistent Direction. Numerous Flareups
on SW side of FIRE. Origin of Blow up
Matches Coopers interp. Bailing Below Longnecker
crossed Major Drainage & then Blew up.
Most concern was for Spots on Top of Ridge.
Real strong winds. After last Drop I immediately
went to Helipart, Dropped off Bucket & went
Right Back. When I got Back as the Air it
was Blown up! Could not see anything in Draw
used As Escape Due to Smoke & Flame from Blow up. Over 5-10 minutes

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 Signature of Person Giving Statement
 7-22-94

16. DATE/TIME ENDED

7/11/94 1335

17. OFFICER'S SIGNATURE

Paul Wirth

18. WITNESS SIGNATURE (If Applicable)

Mike Clarkson

Mackey Told Them to Go to H-1 & THEN
THEY COULD NOT MAKE IT THE TURNED BACK to
H-2.

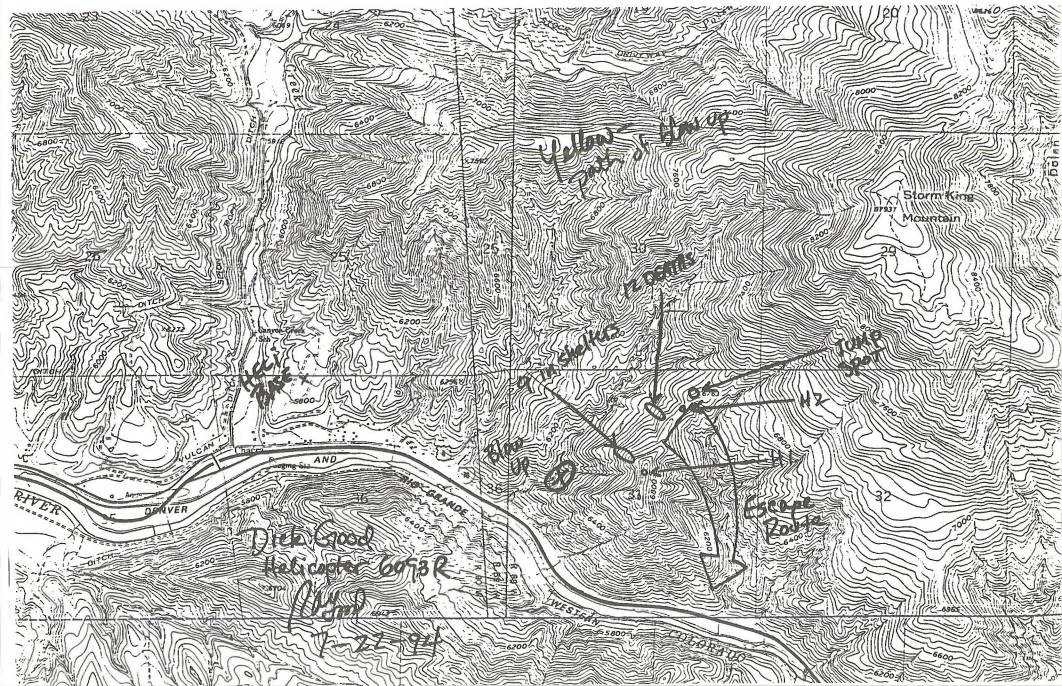
HE REMBERS DOING SOME RECON EARLIER w/NOT MUD.

DISCUSSED LINE ON SPINE w/ LONGNECKER to avoid
FINDER OF UNBURNED FUELS

LONGNECKER did it on RIDGELINE BELOW other SHELTERS.
waited it out

* DOWN CANYON FROM SPIKY RIDGE WAS WHERE THE
FLARE UP OCCURRED ON OTHER SIDE OF CANYON.

NO OBSERVABLE WIND SHIFT THROUGHOUT THE DAY.



**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Haugh, Brad

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Firefighter, BLM, Grand Junction District, Grand Junction, CO

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Hilton Hotel GWS
Grand Junction, CO

13. NAME OF OFFICER TAKING STATEMENT

Sue Husari

14. DATE/TIME STARTED

0900 - 11:00
7/8/94

15. STATEMENT

(personal statement of 7/14/94 1430 attached)

Derek and Brad working down the line near top--made contact with Brian (PIHSC).

Sequence (Brad Haugh)

Brad on fire on day one. Pulled off Copper Spur Fire July 4 to come to fire viewed fire from halfway between C. Creek and South Canyon exit. Saw small lightning fire on knob. Decided not to hike in at 1830 on 7/4/94.

7/5/94, Supervisor, Butch Blanco

0630: Hiked up South Canyon drainage, sidehilled up to build helispot 1. Built helispot and started line construction west. Pulled off fire at 1730. First (eight) jumpers arrived on fire in evening (indirect). Two slurry drops during day. Estimated size 20-30 acres. Fire backing all during this period. Jumpers to widen line. Fire rolled over helispot and line that night.

7/6/94

HANES

Eleven people--hiked in higher up drainage. Two groups. Blanco Hges, Abbot tied in with jumpers and met them at helispot 2. Don Mackey: Butch and Mackey discussed strategy. Handline up ridge. From helispot 2 toward helispot 1. Indirect. Jumpers had burned out starting at helispot 2 to helispot 1. Just

I have read the foregoing statement consisting of 10 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

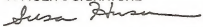
I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/8/94

17. OFFICER'S SIGNATURE



18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service

STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

3. PERSON MAKING STATEMENT (Last, First, Middle)	4. SOCIAL SEC. NO.	5. DOB	6. SEX
7. HOME ADDRESS (St, City, State, ZIP Code)	8. DRIVER'S LIC. NO.	9. PHONE (H) (Area Code)	
10. EMPLOYMENT (Occupation and Location)		11. PHONE (W) (Area Code)	
12. LOCATION STATEMENT TAKEN	13. NAME OF OFFICER TAKING STATEMENT	14. DATE/TIME STARTED	

15. STATEMENT

conserved the litter. Planned to put Prineville some building line on east, others on west. Flare-up along the line. Either the blackline or the fire had jumped the line. Started a burnout operation at 1200 to get rid of islands. A pinon flared up and a tree on the other side of the line torched. Got a couple bucket drops on tree and built line around tree. (BLM + seven jumpers.)

Did more work closer to helispot 1 to widen line to hold fire on west side of ridge. Oak brush 12-15 feet tall in places. Average 5 feet. Typical 6-7 feet across ridgeline.

Eight more jumpers came in at 1100 north of helispot 2. Fire still creeping and smoldering. Got a weather forecast over the radio from dispatch. Pulled up NOAA WX radio. On work channels: Grand Junction gave a WX forecast, talked about a cold front, expect snow at 11,000-12,000 feet, winds 5-10/11-13 gusting to 20-25 mph. Two hours changing and increasing.

Blanco--no WX briefing. I went through people with radio to make sure they understood and heard the WX. Probably heard just because it came over.

- Half Prineville crew delivered to helispot 2. Went down the west slope.
- Jumpers below the two BLM crew people working just below the intersection.
- Jumpers down west flank.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service

STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

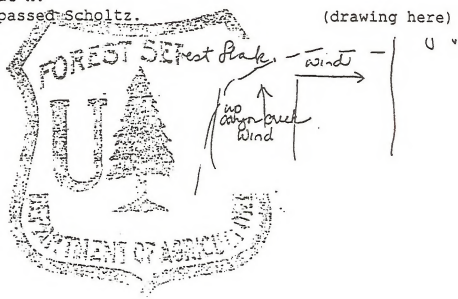
13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

- Lunch at X.
- Bryan passed Scholtz.

(drawing here)



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SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

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12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

312 312
 1527 hrs. Took break (Derek and Eric). Bryan: winds getting squirrely, said it got dicey, that the hotshots and the jumpers at bottom pulling out. Kept cutting line. Told them to bug out. Sudden increase in wind from west. Line on ridge kicked up. Asked for drops (Ryeison). Other groups also asking for drops, building up (Mackey). (Got soaked 100 feet from bucket drops.)

Fire exploded. Calls come over radio. Same time Mackey is requesting buckets (probably pulled out).

Later, 1600 approximately. Waited to see crew come out. Derek waited at tree to see Pineville and jumpers come out. Hectic radio traffic on work channel. Fire picking up at the bottom. Jumped the draws to the other side. Derek and Brad water the fire cross draw and come back up to flank the line. "Get the hell out, don't tie up the radio."

Last radio traffic:

- Butch get out, go up to the helispot. Asked which helispot?

- Make sure which one to Michelle.

- Got word to go up the hill to helispot 1.

Hot back. Running up hill to where the widened canopy line quit. Could see fire coming from west towards the line. Realized could not reach helispot 1 because of fire and

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SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

3. PERSON MAKING STATEMENT (Last, First, Middle)

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11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Best plan formulated with resources available. Need more support.

"Log rolled past the line. Bring a saw back"---radio traffic. From below. Two hours to hike in to the fire originally.



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SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

July 31, 1994 12:05

TO WHOMEVER:

This statement is being made to hopefully correct some of the confusion caused by the joint statement which was given on 07-08-94 by the crew of E-651, myself, and Mike Hayes. I have also enclosed the supplemental statement which I prepared on 07-14-94 giving a more detailed account of what happened from 15:27 on 07-06-94 to approx 19:00 on the same date. I have not included much of what happened after we were removed from the fire and taken to G.W.S. as I didn't feel that had much bearing on what occurred. If you have questions for me you can reach me by phone at 303-244-3100. Thank you for the opportunity to be a part of this investigation. Would it be possible to obtain a copy of the photo taken by Kevin Ericson as I have developed a unique kinship to those who perished while I was allowed to live. Thankyou again.

Respectfully,


Bradley J. Haugh

Signature witness by Eric Christiansen 07-31-94

Per my conversation with John Graber on 07-27-94 I am re-writing my statement as the copy which was sent to me is somewhat confusing and is not my statement alone. I am enclosing the additional statement which I authored on 07-14-94 as a supplement to the statement taken on 07-08-94 with Roy, Sue, and Paul.

07-04-94 16:00 E-675 (Blanco & Haugh) were on the Copper Spur fire and were called off to respond to a fire near Glenwood. Enroute we contacted Sam Schroder of the Sopris Ranger district, and received an update on the fire. We stopped E-675 on I-70 between the South Canyon Exit and the Canyon Creek Exit and tied in with Schroder who was hiking back to our location as the route he had chosen was to steep to be effective. We all pulled back to the Canyon Creek Exit and met up with M. Ryerson's crew of 6. The decision was made to move to the South Canyon Exit for another size up and discussion. At approx. 19:30 the plan was to release the Sopris Engine and E-675 and Ryerson would return to the B.L.M. Office in Glenwood to prepare for an early morning assault from the South Canyon Exit, with the understanding that Sopris Engine and crew of three would also join us. We re-tooled and loaded supplies knowing that we would be hiking out on the evening of 07-05-94. Blanco spent the evening on the phone trying to round up more resources to aid in suppression. Sometime during the night the Sopris Engine was taken away from us.

07-05-94 06:00 We drove to the sight and began our hike into the fire, Blanco went ahead scouting and flagging the way in. All crew members were heavily loaded with extra fuel, water, ect. About 10:00 we made it to the North side of the fire, took a short break and began building a helispot in hopes that if one would become available we would be ready to take advantage of it. The Stihl saw from E-675 broke down with a drive-sprocket malfunction(it broke), leaving us with one operational saw. The spot was built, we broke for lunch. The fire was creeping downslope and occasionally torching as it reached ladder fuels. After lunch we began constructing a direct handline down the N-W. flank towards the Canyon Creek Estates with the understanding that we would work down and out to the Highway. Blanco plus three built handline while the remaining three cleared out the canopy. By approx. 17:30 we were 400' downslope and were beginning our hike out, which was delayed by the arrival of the first load of jumpers. The gameplan was passed on the the lead jumper and we finished our hike out. At the bottom we met up with Byers and Hayes of the G.W.S.R.A. and Engine 651 from Canyon City B.L.M. We all returned to G.W.S. to prepare for the next days assault with the idea that we would stay on the fire from 07-06-94 untill it was out. It was beleived that a helicopter would be made available to us sometime during the day. All gear was loaded and "Jane" was given the job of driving gear to the heli-base when it was set up as she had injured her foot on 07-05-94.

07-06-94 06:00 We drove to the sight and began the hike with Blanco, Hayes, and Abbott going in first to scout a new route and tie-in with the jumpers on scene. We learned that sometime during the night the fire had made a run and breached our line built on 07-05-94. At approx. 09:30 we arrived at the area which would become H-2, rested up, and were briefed by Blanco on our new plan, which He and Don Mackey had devised. While there I dialed up the weather channel on my King Radio, and listened to the forecast. We all began widening the line, sawing and swamping. The Jumpers requested that we all bump up to an area that was being pushed by the fire which they wanted to secure with a burnout operation. While working on that a tree spotted across the line and was quickly extinguished with saws, water drops, and handtools, the area was lined and we were given new assignments. My swamper Derrick Brixey and myself were instructed to saw and swamp down the line that was being worked on by jumpers and shots, which we did. Sometime during the morning another load of jumpers, and the shots arrived on our fire. At approx. 14:00 Brixey and I took lunch for 15 mins. (see page two for a continuation)

This statement is being prepared by Brad Haugh as a supplement to the statement given 7-8-94, to the team investigating the Canyon Creek Incident which occurred 7-6-94. This statement is focusing on the period of time between 15:27 and 19:00. At 15:27 myself, and Derrick Brixey were working the headline which led from the ridgetop down the northwest flank of the fire. After taking a short break we continued widening the line by sawing and swamping. Within just a few minutes the fire breached the line on the top of the fire and the helicopter was sent to do bucket work. Shortly thereafter, the fire breached the line near the bottom of the fire. I did not witness these events but heard them over the radio. The lower breach may have been caused by a log which had rolled over the line, as I remember hearing someone calling for the saw to bump back and cut up a log which had rolled. Mackey called for some bucket work on his section of the fire, but the helicopter was now involved in ferrying gear to the top. The pilot asked Mackey if he could wait a few minutes and he said yes. Within a very few minutes the order was given by Blanco to move up to the safe zones, when asked which one he replied the old one which has since become H-1. From my vantage point under "the tree" I noticed that the fire had spotted over the drainage W.N.W. of my location. I reported that to Blanco he replied get out and don't tie up the channel, I replied that I would start up and out when I had a visual on the crew. At this point I sent Brixey to the top of the ridge with the chain saw. Kevin Ericson made it to my location and we chatted for about 45 seconds, he ask me to get his camera out of his pack because that was his brother-in-law down there and his family would never believe this. I had the entire crew in sight at this time. It appeared to me that the crew was unaware of what was behind them as they were walking at what I considered a slow pace, tools still in hand, packs in place, and the sawyer still was shouldering his saw, the crew was still spaced about 5' apart. I shouted down "Hey kids let's pick up the pace and get the Hell out of here." There was a slight ridge behind the crew which obscured our view of the bottom of the fire. The crew was walking through Gamble Oak approx. 7' tall. As best as I can re-collect the fire roared behind the ridge, and that was the first indication of how bad it had gotten. Jumper Thrash made it to our location at the tree and said should we deploy? I replied no we have to make it over the ridge. The fire storm literally exploded behind the ridge with approx. 100' flame height. At this point I decided I had to run. I can't recall if anyone was ahead of me or not, nor can I recall what the crew's reaction was to the blow-up. As I neared the crest of the ridge the heat was intense. I topped out and headed down the other side about 150' when I turned around a wall of flame 150' tall and 1/2 wide was on the ridge-top and starting to roll down the East side of the ridge. I ran approx. another 150' when I literally ran into Kevin Ericson. I am not sure if we spoke or not but, at the same time Eric Hipkey emerged from the brush with his hands badly burnt. Sensing real danger we opted to go lower on the ridge before we stopped to dress Eric's wounds. Using T-shirts, towels, and bandanas we wrapped Hipkey's hands and hurried him down the ridge to the drainage at the bottom. We hooked up with other survivors and hiked out to the interstate. In retrospect I cannot remember if Ericson's pack was still on his back. If his camera survived it will show that the crew did not know how grave of danger they were in. Despite what the photo may or may not show, I know in my heart that the 12 persons who died in that part of the fire were unaware of what was happening and did not have a chance to flee in time.

RL 1/2

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07-31-94
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(3)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Heffner, Paul

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Manager, West Slope Fire Center, BLM, Grand Junction, CO

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

Hilton Hotel
Grand Junction, COLes Rosenkrance7/10/94 1900

15. STATEMENT

West Slope Center works under the direction of the State Office Fire Management Officer. Provides support for BLM, NPS, FS and State Lands. Has some multi agency funding, but is primarily funded by BLM. Staff are BLM employees. FTE is major constraint for hiring adequate personnel.

Staff consists of 3 permanent positions: Manager, Logistics Coordinator and Training Specialist. Other positions are filled with seasonal employees. *AND WAE*

Life & Property West Slope does set priorities when there are multiple requests based on "values at risk" and fire potential as expressed by the requesting office.

Prior to Wake fire there were some resources available at West Slope Center. But Wake fire became the priority.

7/4 Paul indicated that he and Pete had a discussion and Pete told him he really needed to get something on the South Canyon fire. West Slope then ordered more resources.

West Slope has no responsibility for fire operations. Only getting the resources that are requested by the Districts.

I have read the foregoing statement consisting of 1 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/10/94 2030

17. OFFICER'S SIGNATURE

18. WITNESS'S SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Hipke, Eric

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Smoke Jumper, USDA FS, NCSB, Winthrop, WA

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

Hospital
Glenwood Springs, CO

13. NAME OF OFFICER TAKING STATEMENT

Mike Clarkson, Paul Werth,
& Jim Webb

14. DATE/TIME STARTED

7/9/94 1615

15. STATEMENT

Not REAL spooky. Scouted it well from air. Jumped morning of tragedy. Fire was creeping around. Built about $\frac{1}{2}$ mile of line.

1400 ate lunch w/R-1 jumpers and then went back 1445 to check line for rolling rocks and embers, and to improve cup trench in problem areas.

Noticed flare up in late afternoon in bottom of canyon below lunch spot. Figured best thing to do was to move along line toward H-2.

Within a minute or two intensity builds and they notice it had crossed canyon. Picked up pace to fast hike - kept equipment. When they got to last steep pitch Thrash said, "Shelter." Thrash, Roth, Hipke, Prineville IHC, Mackey is order w/Thrash leading. No doubt in Eric's mind sheltering was not good idea. Went around Roth & Thrash & kicked it in gear. About $\frac{1}{2}$ way up the last pitch saw Erickson & Haugh. They took to drop equip. Rest were 20-30 yards behind him. Running & trying to get shelter out & use it for shield & a blast of hot air knocked him to the ground. Didn't have gloves on - Had hat on backward which protected neck & head. Thinks blast went over him.

He was near the top. Got back up, dumped pack, went down till he felt safe. Joined Erickson & Haugh. They wrapped hands with t-shirts & soaked straps w/H₂O. Went down gully which, ~~_____~~ either melted off or fell off when I hit the ground). They were first down gully & were always ahead. Didn't usually the smartest choice, but it was clear of debris and quickest way out.

I have read the foregoing statement consisting of 2 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 Signature of Person Giving Statement
 8-1-94

16. DATE/TIME ENDED

7/9/94 1720

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Hipke, Eric

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

~~REDACTED~~

Recognized problem w/ building line downhill

Winds & Fire progressed @ same time

~~REDACTED~~ NO!

Knew about cold front, which alters wind changes, had no warning of extreme winds.

NOTE: Double spacing would have made page 1 much more easier to correct

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Eric Hipke 8-1-94

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17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Little, Steve

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Firefighter, USDA, FS, Savannah Riv. Forest Sta., New Ellenton, SC

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

*By Telephone

John H. Graber

7/18/94 1105

15. STATEMENT

* John Graber called from the Hilton Hotel in Grand Junction, CO and spoke with Steve Little at the Savannah River Forest Station in New Ellenton, SC.

Experience: 4 years as full-time firefighter.

7/6/94

Via helicopter, flew from Grand Junction CO, to canyon Creek Estates helibase. Dick Good was pilot and Robert Browning and Rich Tyler, who were fellow members of the helitack crew, were also passengers. Helicopter was 93R.

Between 0900-1000, made reconnaissance flight in 93R of fire. Fire was just smoldering or creeping with fingers like black paint. Northwest side of ridge had big green pocket of vegetation. East, southeast, and south faces of ridge were black spots. Picked up Don Mackey and Butch Blanco at helispot H2 and went back to helibase. ~~Rich Tyler~~ was along on flight, Good was pilot. Mackey and Blanco discussed tactics and strategy on how to attack fire, i.e., go direct or indirect. This discussion took place at the helibase.

Going indirect, they knew they would get a good burn-out, but weren't sure they could hold the fire. They decided to go direct with the knowledge that more resources were coming.

93R then took Mackey, Blanco, Browning, and Tyler back to the fire and landed on helispot H2. Helispot H1 wasn't being used because of too

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SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/18/94 1215

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Little, Steve

4. SOCIAL SEC. NO.

5. DOB

6. SEX

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8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

much slope. Helispot H2 was 200-300 yards north of helispot H1.

At about 1230, 93R started bucket work on fire. Don't know how many buckets. 5 minute turnaround time from fire site to fire.

IC ordered buckets (guessed it was Mackay)

Prineville hot shot crew was waiting at helibase till after bucket work. 2 loads of 5 hot shots were ferried to helispot H2. IC wanted more bucket drops, i.e., 6 or 7.

Remainder of hot shot crew and smokejumpers ferried to fire between 1330 - 1400.

After unloading remaining crews, 93 R returned for cargo work (4 loads) about 1430.

93R resumed bucket work at about 1500.

Busload of 30 smokejumpers was in route to helibase to be ferried to fire.

Fire came over line and Michelle Ryerson ordered one more bucket from 93R.

After bucket drop, 93R went immediately back to helibase and dropped-off bucket. Trip between fire and helibase takes 5 minutes. Heard

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S. D. L. 8/9/94

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17. OFFICER'S SIGNATURE

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**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Little, Steve

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12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

radio traffic from ground ordering personnel to get out. This was first indication of blowup. 93R went back to fire solo.

During blowup, asked IC if structure protection was needed. IC said the it was already taken care of. This was last communication with the IC.

About 10 minutes after last communication with IC, harnessed-up with Dissel along with trauma kits and waited for 93R. Went back to five in 93R and spent 6 or 7 minutes over it. Had communications with ground crew that fire shelters were deployed, but didn't know with who. From 93R, could see 5 or 6 fire shelters upslope and 2 downslope on spur ridge. Saw an additional shelter northwest of spur ridge and below the 2 downslope deployments. Shelter was shiny copper color with black over it. One firefighter waved from group of 5 or 6 deployed shelters.

Made several passes over deployed shelters and east side of ridge. Went back to helibase.

Winslow Robertson took reconnaissance flight with 93R (not sure if Dissel was along).

Helibase was very busy.

There was confusion on whether all pilots were on same frequency.

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S. D. L. 8/9/94

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA Forest Service		STATEMENT <i>(Reference FSH 5309.11)</i>		1. CASE NUMBER	
2. NATURE OF INVESTIGATION					
<u>South Canyon Fire</u>					
3. PERSON MAKING STATEMENT (Last, First, Middle)			4. SOCIAL SEC. NO.	5. DOB	6. SEX
<u>Little, Steve</u>					
7. HOME ADDRESS (St., City, State, ZIP Code)			8. DRIVER'S LIC. NO.	9. PHONE (H) (Area Code)	
10. EMPLOYMENT (Occupation and Location)				11. PHONE (W) (Area Code)	
12. LOCATION STATEMENT TAKEN		13. NAME OF OFFICER TAKING STATEMENT		14. DATE/TIME STARTED	
15. STATEMENT					
<p>Medivac from Grand Junction, CO, St. Mary's Hospital arrived at helibase. About 4 minutes later, another Medivac copter arrived at the helibase.</p> <p>When Robertson returned in about 10 minutes, he wanted to take smokejumper's back to fire to find people.</p> <p>Hot shot crew, smokejumpers, and other crew all had different work radio frequencies, except for tactics. It was hard to contact individual crews when trying to make lists of those accounted and not accounted for.</p> <p>30 smokejumper's were ferried to fire for search and rescue. It took 5 or 6 loads.</p> <p>93R flew out firefighters who deployed fire shelters (3 trips). The faces, and clothing of these firefighters were covered with soot and ash. One firefighter had part of a fire shelter stuck to his shirt (male 6 feet tall, 170 lbs.). Most of these firefighters saved their shelters.</p> <p>At about 2030, the smokejumpers at the fire reported via radio that there were 6 fatalities.</p> <p>At about 2100, coroner at helibase was trying to get body bags to the site. 93R Good refused saying he had enough. Sheriff and coroner</p> <p>I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.</p> <p>I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.</p>					
<u>S.D. L 8/9/94</u> SIGNATURE OF PERSON GIVING STATEMENT				16. DATE/TIME ENDED	
17. OFFICER'S SIGNATURE			18. WITNESS' SIGNATURE (If Applicable)		

USDA
Forest Service
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Little, Steve

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

decided to wait until the next morning.

At about 2145, drove back to motel in Glenwood Springs. 15 mph wind sock at helibase. 3/4 to all the way standing out, throughout the day with winds south-southwest in direction. Winds changed direction to West-northwest when blowup occurred.

Dissell instructed Pat Medina and Brian Cardoza to warn residents to get ready to evacuate from Canyon Creek Estates after blowup occurred. Fire marshal visited earlier in day about potential evacuation warnings. Jannie Jarrett was at helibase at about 0900 making sure cubis and packs would get up to the fireline. She helped get supplies to the fireline not aware of any weather forecasts. Had radio on work channel and helitack crew frequencies only.

Paul Heffner has roll of film of pictures taken of fire from helibase - would like it back.

Will probably be back at Western Slope Fire Center on 7/24/94 on detail.

Dissell has manifests. They should've been posted in van at helibase or be in Dissell's manifest book.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

S.D.L. 8/19/94
 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

~~Longenecker~~
Longenecker, Dale

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Smoke Jumper, USDA FS, NCSB, Winthrop, WA

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

 Hilton Hotel
Grand Junction, CO

13. NAME OF OFFICER TAKING STATEMENT

Mike Clarkson & Jim Webb

14. DATE/TIME STARTED

7/8/94 0953

15. STATEMENT

A. M. Load

Knew cold front was coming through. Jumped with Cooper & Feliciano. Fire wasn't very active. Brush patch was concern. Saw team leader. He had a radio communicating with Mackey. Folks knew going downhill was Bad Deal - But with 16 jumpers & IHC Crew they could do it. Had helicopter look it & it looked good around 1300. Had asked for additional air support to ferry crews. No airtanker available. Couple Torch Outs prior to Blow-Up and not flying hard. View of fire was limited. Patrelli said it had spotted across. Bottom blew out and came out & up then. Stayed on the spot. They ate lunch cause it had burned earlier. Others spread out? Another helicopter & crew working from bottom may have helped. Is not aware of any action from bottom. Did not deploy shelter & was fine. Hipke passed all folks on fireline. Folks started moving out when Patrelli called. Fire shelters are of no use in this fuel type! Thinks there was BLM person IC (name started with B?) Impression they'd give them whatever they - BLM wanted not necessarily what jumpers ordered.

Impressions

Got its energy not from reburns, but from new area where spot occurred. No real weather event just torching & then blow up. Was depending on wash to hold & did not anticipate going around & flanking them. Not sure where helicopter was. But thinks it may have been fueling. Willing to go back on site and review events. He felt whole wash was safe.

*Phone interview also attached

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I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/8/94 1033

17. OFFICER'S SIGNATURE

18. WITNESS SIGNATURE (If Applicable)

7/13/94

1700 - fall

Dale Longnecker

Time: ate lunch it was 1400.

I started out that morning in Grand Junction. Rick Blanton said that a cold front was expected to go through that day (July 6). He said that it would make the small fires bigger. It was calm when we jumped the fire with nice air. When we got on the ground we got our gear together. Archulata called Mackey to get instructions. He said that he wanted us to start down the west flank building direct line. I had looked at it from the air. I could see the bottom finger in the drainage from the airplane. It looked sparse enough in the drainage that it looked like a safe area, especially when compared with the continuous fuels in the brush field. Don had gone up in the helicopter and looked at it too. I met with Mackey to discuss the planned action. We looked it over. The line was in a hazardous area. We questioned whether we should be in here at all. We looked at the area. The winds were light at that time. There was not much fire activity. I figured that with 16 smokejumpers and a hot shot crew we could hook the fire before the front passed. The line construction proceeded well through the brush patch. The line construction took a little longer than I expected. I remember one time when were about half way through the brush patch. There was some fire activity and Mackey may have considered pulling out from the line. He pulled a couple of saws back to work on the fire and used water drops to cool it down.

DKL

The fuels looked sparse down lower and it had a southerly exposure so it was not as continuous. In the area of the double draws there was an obvious open area in the draw with an occasional tree and a lot of bare ground. I identified the lunch spot and the draw as a safety zone. I sat down to eat and finished first. I decided to scout out the spot fires out ahead. There were active places in the existing burn. I left the group. I told them it was a relatively safe area if the fire blew up. I told Petrelli that I was going to check it out. I got to the first area of active burning. It was small. I called Tony to tell him to send a chainsaw but first I would get a bucket drop. I got one drop and then the fire activity picked up on top so they asked for the bucket and gave it to them. After I lost the bucket I told Tony to stay out in the wash until we got the bucket back. I stayed near the active area which was a fair shag from the bottom -- 200 yards. When I was checking out the spot I was in a bad location to see what was happening. Tony was out in the open wash and could see. I did notice some torching in the interior. At that time the helicopter pilot said the activity was picking up and shortly after that Tony told us that it had spotted across the canyon. I knew that I needed to get to the safety zone. I could see in the bottom that it had crossed the canyon and burning at a high rate of speed.

Dale Longnecker 8-3-94

Crossed over ~~the~~ ^{Canyon} straight across from the double drainage. The fire spotted to the other side. I ~~could~~ ^{could} not ~~see~~ ^{see} when it crossed back to the side I was on again. Then it was obvious that we needed to get out. I sent Tony up the ridge. ~~_____~~ We (9 jumpers) ^{did not have a} chance in brush patch. I was separated from the other jumpers. They went up the ridge to a place not too far from the top. When we stopped for lunch I recognized the lunch spot as safety zone so I went there. There was not too much heat. I did not use a fire shelter because it was not threatening enough. ~~_____~~ DKL

Don called on the radio to see if we were OK. I said yes, that we were in a safe zone. I think that he called when he tied in with the people on line. Don was not too far behind us when we took the lunch break. Later during the buckets on top, Don may have gone up to see what was going on up top. I think he went back down into the brush patch to make sure everyone was getting out.

I worked with Mackey and not Blanco. I couldn't tell you who he was.

I talked to Don about the weather. We discussed that winds were predicted with the cold front. We thought that we could hook it before the front hit.

From the air I could see that the brush patch was the problem. Once we were through the brush patch I breathed a sigh of relief.

Perspective: I would make another situation that shouts watch out. When you don't receive the resources that you need or you are debating with the dispatcher about the resources that you need. Needed more of everything on this fire. Dispatch didn't want them to use retardant. Wouldn't give us more than one helicopter. I understand there were a lot of fires in the area. Dispatch seemed to be placing more value on houses than on lives. There were firefighters' lives on the fire. Houses can burn as long as the people have been evacuated.

When the fire did start to blow. Don requested a load of retardant. Dispatch ^{asked if} it was threatening houses. He said we have a real bad situation here. We got everything if houses were threatened. Use of escape routes and safety zones prevent fatalities, not fire shelters.

Dale K. Longnecker 8-3-94

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

94 JUL 27 A9:00

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Lotvedt, Don

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Fire Management Officer, BLM, Colorado SO, Denver, CO

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

Hilton Hotel
Grand Junction, CO

Les Rosenkrance

7/13/94 1330

15. STATEMENT

Don Lotvedt

(Interview and also personal statement attached)

Don is the BLM State of Colorado Fire Manager Officer. Don is located in the Colorado State Office. His supervisor is Ron Cole Branch Chief for Engineering and Support Services.

Don indicated he did not have a strong fire background, but had over 10 years of management experience as an Area Manager prior to his current position. Don stated that he is delegated line officers authority during the fire season.

Hated that the Colorado fire program has been hurt in recent years due to budget and FTE reductions. Seasonal fire crews have been reduced. (He said he would follow-up with a statement about the extent of this impact).

When asked about pre-season and post-season fire meeting, Don said that he and the District IAM's attend the Rocky Mountain Region Interagency fire meetings in spring and fall. No managers attend (i.e. District Managers or State Director). Don is not hooked into the IAM & systems at the State Office. He would like to be, but hasn't been able to get that done yet. Says he really does not know too much about IAM's. Not sure of how the spot weather forecasts are transmitted to Districts, Resource Areas or fires. Assumes they all receive the information. *Generally*

I have read the foregoing statement consisting of 4 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/13/94 1430

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Lotvedt, Don

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

to my knowledge
Trys to
 Fires are not critiqued, but Don ~~does~~ attend close out of Incident Command Teams. He is not aware of any District Managers conducting fire Critiques of District Fires. He has not gotten to Glenwood Springs, felt he would be of more use in Grand Junction at West Slope. ~~It was not there where he should be.~~

Don stated he would prepare a statement showing actions taken to prepare for extreme fire season predicted for Colorado. Colorado did apply for severity funding and received \$162,000. money was to be used to support District Fire Programs.

Don seems to be aware of strained working relations between Grand Junction District and West Slope coordination center. *I felt that the situation had been improving with better communication.*
 Feels that State fire management position is too low in the organization to be effective.

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Don Lotvedt 2/1/94
 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Personal Statement Faxed to Fire Investigation Team at the Hilton Hotel in Grand Junction, CO on 7/14/94 3:14 p.m.

During the later part of June, the Districts were getting stretched, but were able to pretty well conduct effective initial attack. Craig was probably in the most critical shape sine they historically, have the most limitations.

In mid-June Paul Heiner started working with the Districts to prepare a severity request since it was becoming apparent ~~most~~ that would be necessary. Towards the end of June, major fires started breaking out that became Regional priorities for available resources (list is attached). At that time we were finalizing our severity request and ~~also~~ implementing a statewide fire ban in preparation for the July 4 weekend.

The holiday weekend brought a lot of lightning and many new ignitions. Hour glass fire was #1 priority for resources that weekend.

~~_____~~ due to threatened structures. As I recall, our morning sit. report showed more than 50 new fires reported by our Coordinating group met every morning at 9 a.m. through the holiday weekend. Our first meeting was approximately at 7pm on Friday, July 2.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 Signature of Person Giving Statement

 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Lotvedt, Don

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

On Tuesday, July 5, I attended the group meeting in the morning,, finalized the severity request memo and left Denver for Montrose at 5 p.m., ~~since that had saved lives going including the Wake Fire which had destroyed structures.~~ I hadn't heard of the South Canyon fire yet at that time, but as I drove past Glenwood Springs I noticed a smoke column north of I-70 a short distance West of Glenwood. As I drove by that area I noticed some firefighters gathered in the North side of I-70 apparently waiting for something. I looked up on the hillside as I passed by and saw some flames and burning areas, but nothing that I saw looked particularly threatening. I assumed they would have it under control soon. (I may or may not have seen the whole fire area at that time).

(HART) I continued on to Montrose and the next day flew the District's going fires (several) with FMO Ellis and FVO Alexander. In late afternoon we proceeded to Notchkiss to visit with the Type II Team () and get briefed in the Wake Fire. It was in that camp that I received word of the shelter deployment. We drove back to Montrose and FMO Ellis arranged a flight for me to Grand Junction where I arrived about dark on Wednesday July 6, 1994.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA Forest Service		STATEMENT (Reference FSH 5309.11)		1. CASE NUMBER	
2. NATURE OF INVESTIGATION <u>South Canyon Fire</u>					
3. PERSON MAKING STATEMENT (Last, First, Middle) <u>Lowery, Mike</u>			4. SOCIAL SEC. NO.	5. DOB	6. SEX
7. HOME ADDRESS (St, City, State, ZIP Code)			8. DRIVER'S LIC. NO.	9. PHONE (H) (Area Code)	
10. EMPLOYMENT (Occupation and Location) <u>Firefighter, BLM, Western Slopes Fire Ctr., Grand Junction, CO</u>			11. PHONE (W) (Area Code)		
12. LOCATION STATEMENT TAKEN <u>Hilton Hotel Grand Junction, CO</u>	13. NAME OF OFFICER TAKING STATEMENT <u>Les Rosenkrance</u>		14. DATE/TIME STARTED <u>7/15/94 2200</u>		
15. STATEMENT					
<p><i>During</i></p> <p>Mike Lowery Early in July, mike started ordering crews. People really did not realize the situation they were in. Hesitancy by FMOs and Rocky Mountain Coordination Center. Both are too conservative. Ordered the crews prior to actual need. Somebody needs to look at this. Rocky Mt. and West Slope should be separate. Make these logistical centers. East zone/West zone. Lots of hesitation by the BLM Districts.</p> <p>BLM does not have MOU with State lands. No parent or reciprocal agreement.</p> <p>Need to look at the total fire program in Colo. Hesitant to pre-position crews. Everyone too concerned about what will it will cost rather than the benefits of efficiency. Western Slope seems to be fairly well prepared with offers for motels, vehicles, ect.</p> <p>Lack of FTE. Not enough people at west slope to do the job. Not even flow meters at retardant base.</p>					
<p>I have read the foregoing statement consisting of <u>3</u> pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.</p>					
<p>I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.</p> <p><i>Michael Lowery</i> SIGNATURE OF PERSON GIVING STATEMENT</p>				<p>16. DATE/TIME ENDED <u>7/15/94 2330</u></p>	
17. OFFICER'S SIGNATURE <i>Les Rosenkrance</i>			18. WITNESS' SIGNATURE (If Applicable)		

USDA
Forest Service
STATEMENT --
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Lowery, Mike

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Leadership in this state sucks. State FMO didn't have a clue-
 Extremely frustrating. Forest Service is no different, they
 didn't have ~~any~~ fires at this time.

Sent here to act for Paul Refner as Western Slope Coord. Center.
 Ended up by being a CO manager with Paul. Too busy for one
 person.

First word he got about increased activity on S> Canyon Fire was
 about 3:00 p.m. by phone from Pete Blume. Requested retardant to
 protect residences.

The first time mike knew any personnel were in trouble was 5:00-
 5:30 p.m. From time of first call things had got really busy.

20:50 before mike knew there were fatalities. Also pretty well
 confirmed who they were.

23:35 briefing with agency representatives. Knew at that time
 there were 14 missing. Initial deployment information sent to
 boise.

7/7 1:30 Dick Mangan, et. all arrived. Briefing and Manifests.
 Started to get information about fatalities.

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 accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to
 make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return
 for it.


 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Towery, Mike

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

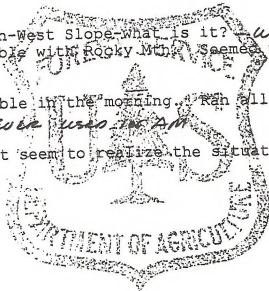
15. STATEMENT

Concerns

Fire organization - West Slope - what is it? *what is their role*
 Had lots of trouble with Rocky Mtn. *seemed* to be a stumbling
 block.

Retardant available in the morning. *Ran* all afternoon, after it
 was too late. *NEVER USED IN AM*

FMO's just didn't seem to realize the situation they were in.



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I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

8/2/84

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Moore, Bob

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Colorado State Director, BLM, Denver, CO

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

Hilton Hotel

Grand Junction, CO

Les Rosenkrance

7/14/94 0915

15. STATEMENT

Bob Moore

Bob has been State Director of Colorado since January 1990.

Bob works through the Deputy State Director of operations and the Branch Chief for Engineering and support which includes fire. Due to an on going change to a new organization there is no Deputy of Operations. Instead the Division of Operations is being combined with the Division of Administration. Therefore, Gil Lucero is the Deputy over fire. Ron Cole is the Branch Chief. Ron does not have any background in fire management or operations. Gil Lucero, the Deputy, does not have much experience in fire, except for possible administrative functions.

Don Letvedt, the State Fire Management Officer has very limited fire experience. Prior to Bob coming to Colorado State Office Don was reassigned to this position after budget reductions and reorganizing the Montrose District eliminated his position. Reductions in budget and FTE has eliminated management options for employee placement and requires managers to settle for placement of employees in less then optimal positions and experience/ qualification mix. In some cases employees are placed in positions where they do not have the technical expertise in the program they are charged to manage.

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I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 Bob Moore 7/28/94
 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/14/94 1045

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Moore, Bob

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Bob is aware of conflicts between the West Slope Fire Operation and the Grand Junction Fire operation. This has been a consistent problem ever since the West Slope operation was established back in 1980. There have been numerous attempts to resolve this conflict with varying degrees of success.

Fire Management Planning has been completed at some level in all Districts. Strategies for prescribed fire is not as good as he would like.

Bob is aware that some resource specialists and managers are reluctant to support aggressive initial attack actions. This is a fairly general attitude here (Colorado) as well as other parts of the Bureau. Except where managers have a heavy fire work load or managers have good fire experience and background.

How did the State prepare in this bad year? Management was not too involved early on. After it was obvious that we were into a bad fire year more management attention was paid to fire. It was only recently that top management started to focus their attention because it was so obvious.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

 Signature: Bob Moore 7/28/99
 SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Past fire review - the Associate State Director always attend along with Area Managers & District Managers. Hold both BLM and Interagency fire reviews. Not sure if District Managers hold critiques of individual fire. Believes they do, but it has not been elevated to his level.

Secretary came to Colorado and visited the fire line on June 30. This really got Colorado's attention. There was considerable concern by Governor Romer about the cost of fighting fires. The governor became very involved in the fire activities including the Wake Fire. He was getting an awful lot of questions about the cost of these fires. Particularly the Wake Fire. He called Bob and wanted to discuss this. Bob was coming to Grand Junction to visit with fire operations at West Slope and go on to Montrose to meet with the Governor. The Governor was concerned about the costs to the state. Attention paid by the secretary and the Governor give emphasis to the importance of the fire program.

Bob flew over the South Canyon Fire at 6:15 p.m. on 7/6. There wasn't any knowledge of the fatalities at the time. Bob arrived at West Slope. Paul Hofner told Bob of the fatalities, 11 confirmed at the time. Bob went to Glenwood Springs right after that.

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Bob Moore 7/28/94
SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS'S SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Moore, Bob

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10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

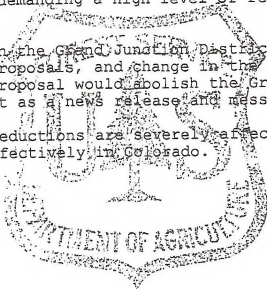
14. DATE/TIME STARTED

15. STATEMENT

Allocation of Resources -- The Wake Fire was commanding a lot of a attention and demanding a high level of resources on July 3rd and 4th.

Lot of tension in the Grand Junction District due to reorganization proposals, and change in the District Manager position. One proposal would abolish the Grand ~~Junction~~ District. Proposal was out as a news release and message to all employees.

Budget and FTE reductions are severely affecting our capability to fight fire effectively in Colorado.



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Bob Moore 7/28/94


SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

[Signature]

18. WITNESS' SIGNATURE (If Applicable)

USDA Forest Service		STATEMENT (Reference FSH 5309.11)		1. CASE NUMBER	
2. NATURE OF INVESTIGATION <u>South Canyon Fire</u>					
3. PERSON MAKING STATEMENT (Last, First, Middle) <u>Petrilli, Anthony C.</u>		4. SOCIAL SEC. NO.		5. DOB	
6. SEX		7. HOME ADDRESS (St, City, State, ZIP Code)		8. DRIVER'S LIC. NO.	
9. PHONE (H) (Area Code)		10. EMPLOYMENT (Occupation and Location) <u>GS-452-6 Smoke Jumper, USDA Forest Service, Forestry Tech</u>		11. PHONE (W) (Area Code)	
12. LOCATION STATEMENT TAKEN <u>Hilton Hotel Grand Junction, CO</u>		13. NAME OF OFFICER TAKING STATEMENT <u>John H. Graber</u>		14. DATE/TIME STARTED <u>7/15/94 0700</u>	
15. STATEMENT <u>See Attached</u>					
					
<p>I have read the foregoing statement consisting of <u>7</u> pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.</p> <p>I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.</p>					
17. OFFICER'S SIGNATURE <u>Anthony C. Petrilli</u> SIGNATURE OF PERSON GIVING STATEMENT				16. DATE/TIME ENDED <u>7/16/94 1800</u>	
18. WITNESS' SIGNATURE (If Applicable) <u>John H. Graber</u>					

WITNESS STATEMENT: ANTHONY C. PETRILLI

JULY 16, 1994

On the 4th of July I jumped my first fire in Colorado; it was called the Oil Springs Fire. The size was 20 acres of rolling hills of PJ. We twelve jumpers from Springerville, AZ worked the fire most of the night with only a little cat nap. We demobbed on July 5 to Grand Jct. I clocked off at 2400. I watched The Weather Channel to see the forecast of a dry cold front was coming the next day with winds. My main concern at this time was jumping in the winds.

When I arrived to the airport the morning of the 6th the word came of a fire call. There was plenty of time to ready gear. The pilots were not scheduled to be on until 0900. The briefing consisted of: 1. that we were reinforcements 2. The fire was 20 minutes out 3. Blanco was the IC, he was a good guy, uses jumpers a lot and do him a good job. When we were getting suited up Eric Hipke, Roger Roth, and I were given radios. I don't know why we were given 3 radios instead of 4. I didn't consider it to be any big deal.

In the air over the fire I saw it was 30-40 acres on top of a mountain. It looked steep, rocky, brushy. The fire had many fingers. I would call it messy. The windows in the Casa jump plane are few and small. During streamer passes I couldn't get a good look at the jump spot. The spotter, Mike Tupper said that there was 100 yards of drift. Billy Thomas and I agreed it looked more like 250 yards. The exit point was correct. The wind drift was straight and steady with very little turbulence. I expected turbulence from the terrain. The spotter told us that Sonny Archuletta was at the jump spot with a wind drift streamer. Eric Hipke and Billy Thomas were the first stick. After they were out the door I could see the spot well. Dale Longanecker, who was my jump partner, discussed our jump strategy. I would take the side of the jumpspot closest to the highway. Dale and I had an intense jump, but both of us did well and made the spot. The rest of the load made it in or near the spot without any major problems. The time was approx. 0930. Picture #1 looking towards the fire with the helicopter with a bucket in the background. While at the jump spot Sonny Archuletta programmed my radio with the fire frequency. All jumpers gathered gear to get slung out by the helicopter in the morning. I remember Longanecker asked Hipke if he wanted to keep the radio. Hipke said that he didn't want it and that Longanecker could have the radio. Billy Thomas and I decided to be a saw team and readied the saw and sig pack. After everyone from my load gathered at the spot Sarah Doehring led us to the fire. On the way to the fire Billy and I stopped at H-2 to do 10 minutes of saw work.

Billy and I arrived at the fire at approx. 1010. We had a short jumper reunion. A bucket drop was made on a burning tree on the top of the saddle. It was apparently slopover. I gave Quinten Rhodes a sig of gas and oil. At this time it was my opinion that Mackey was in charge of the line building and that Blanco was the IC.

Throughout the fire I didn't see Blanco. Although I was not looking for him, I never saw him. I didn't hear him talking on the radio very much. Again, although I was near chain saws, I did hear a lot of other radio traffic. I have been an IC a few times on fires between 10 and 50 acres. I know I was constantly on the radio and walking the fires constantly from top to bottom.

Other jumpers were already headed down the hill. Billy and I bumped around the diggers to the #3 saw position. The winds were 6-10 up canyon. The flamelengths were 6-10 inches. There was no problem next to the flames. At approx. 1025 at the 100 yard mark down from the saddle the chain came off; we were fixing it when I took picture #2. I could see an area further down the hill on a slight ridge that was smoking up. I was concerned enough to keep watching the area while Billy was fixing the saw. After fixing the saw we bumped around the diggers to the #3 saw position again. At approx. 1035 Mackey came back to us and said that we were pulling out. Longanecker called him back on the radio and said to wait and that bucket drops could help. The bucket drops cooled the area so we started back down again. We were sawing again when the #1 and #2 saws with a few diggers bumped ahead to another area that was heating up. At approx. 1300 Rhodes felled the tree on the bottom hot corner of the line. A couple of bucket drops cooled that area. The saw team from the hotshot crew joined us as we tied the in with the line that was made by the folds who bumped ahead. At this time we had four saws and many diggers. Work was at a high level output. We started working up the hill towards the lunch spot. We made it there at 1400 without any trouble.

During lunch I noticed that the jumpers from the 1st load were looking beat. Those jumpers were Rhodes, Soto, Woods, Shelton. Jumpers from the second load were Thomas, Cooper, Feleciano, Longanecker and Petrilli. After eating, drinking,, resting, and talking trash they started looking better. I wasn't very hungry so I just snacked and drank. I noticed that the hot shots weren't eating much either. At approx. 1425 Mackey called for the hotshots to come back down the line to hold and improve the cup trench. Soon after that Longanecker to me that he was going further down the hill to look around.

At approx. 1510 he call us jumpers to come down to where he was. Cooper and Feleciano stayed at the lunch spot. The six other jumpers headed down the hill about 75 yards. I saw Longanecker across the gully of the same mountain, not across the main canyon. He was approx. 300 yards away. He wanted all of us to come down. I told him that I didn't think it was a good idea making more line since we are having trouble holding the line we already had. It is my opinion that you need people to hold line and we were already spread thin.

He then asked for one saw and a couple of diggers. Thomas, Shelton, who had the other radio in our group, and I started down. We walked 10 yards and stopped. The fire made a run in the crowns up the hill from Longanecker. We were impressed with the 100 foot flame lengths and the radiant heat we were feeling even though the fire was 250-300 yards away. What was even more impressive was that the ground fuel was already burnt from earlier during the fire. The fire would travel 150 yards in 15 seconds. Photos #3,4,5 were taken during these three different runs. I told Longanecker to look beside him where the runs were starting. He said that he saw them and that he was fine. We told Longanecker that we didn't want to come down and I thought that he should get out of there. The winds were starting to pick up a little may be to 15 mph.

It is my opinion that these runs that were 150 yards from the bottom of the canyon drew our attention towards that area and not the bottom of the canyon.

I don't know if the radiant heat from those runs could have started the bottom of the other side of the canyon. It is also my opinion that the fire started across the canyon 30-40 yards up the canyon from the runs on the other side. There may have already something burning in the bottom of the canyon that we didn't see.

At approx. 1600-1605 it spotted across the main canyon. I called Mackey on the radio and told him that it had spotted across the main canyon and that we were coming back up the hill. I knew I didn't want to be where I was. He asked me if it spotted across the MAIN canyon. I replied yes it was across

AC Petrilli 8-10-94

the main canyon and its ROLLING. At this time its flame front was 50 yards wide and had traveled 50 yards from when we first noticed it as a spot. It was definitely pushed by high winds, approx. 35 mph. This was a very narrow spot in the canyon where the winds were also being funneled.

As we were coming up to the lunch spot Mackey met us and we all agreed that the place to go would be in the black up the ridge from the lunch spot and below H-1. The one place I knew I didn't want to go was back down the line.

To the right was the gully that Longanecker was in. The area where we were didn't look safe either. This is also where we met up again with Cooper and Feleciano. At this point the winds were at approx. 45 mph. As we were going up I was at the tail to see if we had everyone. I thought Mackey was with us, but I didn't see him. I figured he was going back down the line to get everybody else. He didn't have to come to direct us, but he did. He didn't have to go back down the line to get everybody else, but he did.

As we were scurrying up the ridge, Shelton said he was putting his sig pack down. This was approx. 150 yards above the lunch spot. It was then I realized I still had my saw. I put my saw down beside the sig pack. I knew this wasn't the best place to lay the saw, but putting down jacked the pucker factor up one more notch. My pace increased at this point because of the lesser weight and the higher pucker factor. The steep slope, smoke, ash, and blowing dust were some of the difficult factors we had to deal with. Soto and Woods were dealing with muscle cramps and dehydration. The noise of the firestorm in the canyon was like a jet during take off. The wind was still at 45 mph. Soto and Woods began to fall behind. I passed them, but kept encouraging them to keep coming and ensuring them there was good black up the hill. The area we were going through was black, but the aerial fuels were still there. I didn't want to stay there because I just witnessed previously the hillside reburn with very high intensity. I still didn't know what was going on with the fire below us. There was still very heavy smoke coming from below.

Between 1614 and 1618 I heard Erickson telling Mackey on the radio that there was a spot below them and telling them to get out of there NOW. When the six of us reached our deployment sight between 1619-1621 I called Mackey and told him we were sheltering up. I do not remember any reply. I felt more comfortable when we reached the deployment sight so I took my time when getting into my shelter. I checked to see that everyone in our group was sheltered up. I laid down inside my shelter and checked my watch and the time was 1624. On 7/14/94 Quinten and I made a test run from the lunch spot to the deployment sight. It took 8 minutes to go 450-500 yards. The actual run on 7/6 started 75 yards below the lunch spot.

When we were in our shelter I talked to Longanecker he said he was on the ridge below us and that he was fine. I told him that we were OK. To keep spirits up we talked and joked. Ken Wabaunsee called us from the helibase. Wabaunsee was in charge of a group of jumpers that had been bussed to the fire. They just arrived to see our fire shelters on the ridge. He had no idea what had happened. I told him that there were nine of us on the ridge and we were OK, but we didn't know what the fire was doing below us. Wabaunsee then told me that Erickson and Hipke made it to the highway and needed an ambulance to take them to the hospital. He then told us that Archuleta and Doehring made it to the freeway. We started getting a head count of all the jumpers. We were missing Mackey, Thrash, and Roth. I called them on the radio. No reply. I called them again. No reply. I remembered when Wabaunsee was talking to Erickson I couldn't hear Erickson's transmissions. I had hoped that Mackey and Roth were by the freeway and couldn't get radio transmissions in or out.

When in the shelters the fire made three different runs on our right side approx. 200 yards away. Inside the shelter it heated up to 110 degrees.

Ac Petrelli 8-10-94

During the hottest run there were glowing fire brands blowing into the shelter. Between fire runs we would peek out the shelter. The wind was still blowing ash and dust. There was still heavy smoke coming from below us. Inside the shelter there was much less ash, dust, and smoke.

At approx. 1730 an air tanker dropped a load in our area. At approx. 1800 Tanker 10 dropped a load that landed directly on us. Smoke from below was not as heavy, but the retrained gave us a little more reassurance. Soto and Woods carried their shelters closer to us. At approx. 1830 we decided to get out of our shelters. Longanecker came to our area. I asked him if he had to shelter up. He said that he hadn't and that where he was it was fine. We were trying to organize a sweep of the hillside to look for the missing. He said that he was going to the helispot. As he walked away I looked at his fire shelter pouch and saw a folded rain fly. That is not to say he didn't have his fire shelter inside his pack.

As we were looking into the canyon we noticed something below the saddle on the line that didn't look like the surrounding area. Instead of sweeping I headed straight for that area. I walked straight to the lower group of bodies. I called the helicopter and said that I had found five. He asked if we needed medi-vac. I told him that it was too late for that. I walked up the hill and found six more. Called the helicopter again and informed them of the additional six. After I found the twelfth body I walked over to the helispot.

I boarded the helicopter on the last load of the nine. I viewed the line as we flew out I saw nothing. At the helibase I drew a map of the fire and the fireline. I wanted to help the search and rescue jumper crew as much as possible.

Watch Out Situations.

1. Fire not scouted out and sized up. The map that was drawn by Mackey and Blanco was incorrect. We needed somebody walking the fire, lookouts posted and an aerial observer.
3. Safety zones and escape routes not identified. Escape routes were too long. The crew had to travel approx. 600 yards to the safe area of the saddle. For us it was 500 yards to a good black area where we felt it was safe. There really weren't any safety zones.
4. Unfamiliar with weather and local factors influencing fire behavior. Some people knew of the high wind forecast. The tight canyon funneled the wind so that when it crossed the canyon the winds pushed it even more.
5. Uninformed on strategy, tactics and hazards. Strategy and tactics were known, but not the hazards.
7. No communication link with crew members/supervisors. The IC did not communicate.
8. Constructing line without safe anchor point. That is a very profound statement.

Ac Petrelli 8-10-84

9. Building fireline downhill with Fire below. The trouble came from the bottom of the canyon.

11. Unburned fuel between you and the fire. That was not the case until it crossed the canyon.

12. Cannot see main fire, not in contact with anyone who can. I was the first to see it cross the canyon. I should have seen the problem earlier and made contacts then.

13. On a hillside where rolling material can ignite the fuels below. It could be that rolling material ignited the bottom of the canyon.

14. Weather is getting hotter and drier.

15. Wind increases and/or changes direction. I do believe the change in wind speed happened quickly. Fire may have been in the bottom of the canyon for some time until the wind blew it up.

17. Terrain and fuels make escape to safety zones difficult. Our escape route gained 500 feet in elevation over 500 yards. The fireline gained 400 feet over 600 yards.

18. Taking a nap near the fireline. Some of the jumpers from the first load were fatigued and dehydrated.

Fire Orders

Fight fire aggressively but provide for safety first. We were heavy on the aggression, but light on safety.

Initiate all action based on current and expected fire behavior. No one expected the fire to run like it did, but some had an idea the fire behavior was going to increase.

Recognize current weather conditions and obtain forecasts. The only weather forecast received was from NOAA. No spot weather forecasts were done. No fire weather forecasts were given.

Ensure instructions are given and understood. This was done.

Obtain current information on fire status. This was not done until it had crossed the canyon.

AC Patrol 8-10 AM

Remain in communication with crew members, your supervisor and adjoining forces. Communication goes both ways; up and down.

Determine safety zones and escape routes. Not done well.

Establish lookouts in potentially hazardous situations. This was not done.

Retain control at all times. We did that well in the morning, but not at 1600.

Stay alert, keep calm, think clearly, act decisively. We did these except stay alert.

A.C. Petrucci 8-10-74

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER:

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Prineville Hot Shot Crew

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

Prineville Hot Shot Crew, Prineville, OR

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

Hilton Hotel

Grand Junction, CO

Roy Johnson, Sue Husari,

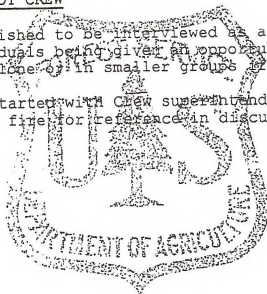
Paul Werth, & Paul Bidwell (OSHA) 7/8/94 1015

15. STATEMENT

PINEVILLE HOT SHOT CREWFormat:

Crew wished to be interviewed as a group, with individuals being given an opportunity to meet with team alone or in smaller groups if necessary.

The discussion started with Crew superintendent drawing a schematic of the fire for reference in discussing the sequence of events.



I have read the foregoing statement consisting of 12 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/8/94 1200

17. OFFICER'S SIGNATURE

18. WITNESS SIGNATURE (If Applicable)

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Prineville Hot Shot Crew

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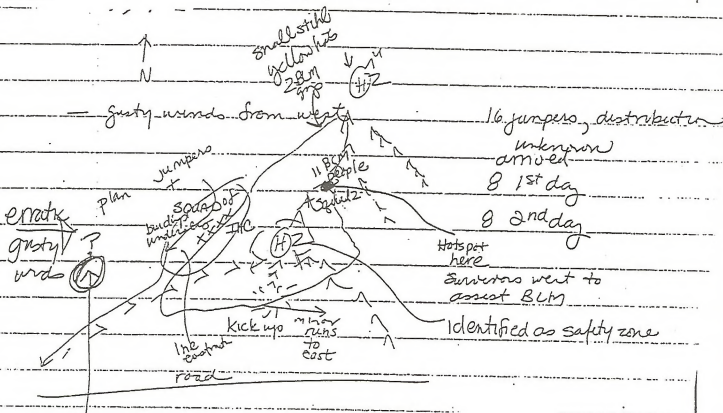
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12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT



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15. STATEMENT

1400 Squad 1 + Supt to H2

Bucket Load

No column on arrival at H2. Light up slope winds.

1530 - 1600

Load 3014 got up at H1 base

1500 at helibase. Straight out wind sock.

1340 Brian Sholes called Tom Shepard

Thunderstorm to south & moved north & disappeared.

Southwest corner picking up

or later

1530

Second load got there

1535

Told to go to helispot

1730

Told firefighters to go to the black. Helispot #2

1604

Asst Brian Sholes.

Took cubics to jumpers working

2-300 feet up and down towards jumpers.

Surface ground fire only, canopy intact all along the line. No good safety zone there.

Area where fatalities occurred.

- Spotted across the draw to west or slopped.

Kelso called tom and said it had spotted. Tom (supt at

H2) couldn't see it "Jumper saw spot" Missoula jumper.

Instructors told Kelso to go into the black at H1.

Back at helispot. Did not make it to the black.

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Prineville Hot Shot Crew				6. SEX	
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15. STATEMENT					
<p>In a short period went from gusty erratic to very strong. Hot spot that BLM weather Squad went to help. Steady, strong wind from WEST. In a minute the wind shifted from south.</p> <p><i>Express for calm - wind in saddle very strong</i></p> <p><i>that the smoke</i></p> <p><i>Wind would blow brush away 30 minutes</i></p> <p><i>OK</i></p> <p>Brian - SB ISO below H2 ? along line. 93 Romeo - drop or flare-up "Cranky" 1600 As drop occurred, blow-up occurred.</p> <p>I have read the foregoing statement consisting of ____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.</p> <p>I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.</p>					
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2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Prineville Hot Shot Crew

7. HOME ADDRESS (SL, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Eric Hipke, Iran - did not deploy/ 2nd degree burns
Winthrop, jumpers with Tammy.



I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

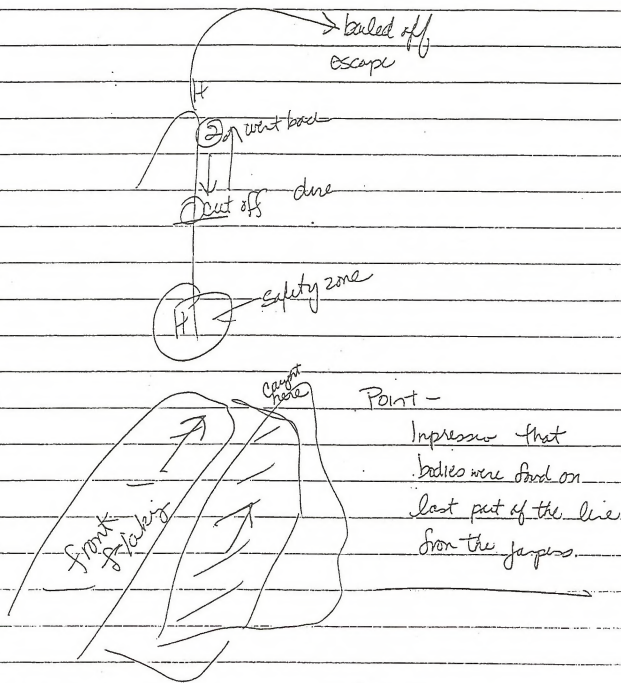
I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)



In room where overtake

Flare lengths
Abnormally long

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Prineville Hot Shot Crew

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Time period was very short beginning with the realization that they were in trouble.

Safety issues/sequences:

- Clouds in air
- Wind
- On line

Back to line, spot, bucket, blow-up.
Running.

600 yards down hill from the location where swing squad was.
covered ground extremely quick.
No radio traffic. Dora Welso radio traffic on road

Questions?

What started the run?

No time to leave after wind started blowing in
earnest.

Information about briefing to Hot Shot Supt:Q. Weather Forecast?

No briefing from anyone on the weather.

No briefing. No equipment, no food, nothing provided.

No fuels information gave to the crew.

Tied in with IC (Blanco).

Butch gave No briefing on weather forecast.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

16. DATE/TIME ENDED

SIGNATURE OF PERSON GIVING STATEMENT

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest ServiceSTATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Prineville Hot Shot Crew

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

IC walked to south knob with HS Supt. Made a plan to implement tactics.

PIHSC

Came off a fire

Had spent week at Kings Canyon and were used to this type of travel and terrain.

Prineville HotShot Travel Schedule:

Grand Junction 1800

Fruita at school - No information

Bus at 0800

Glenwood Springs - reporting office

Didn't have a fucking clue what to do with crew.

Called dispatch office in Grand Junction for instructions.

Instruction were "Can we O.K. to use hand tools in ? .

Got saw and gas → scrounged around and found gas and fuses.

Decided to send people to fire.

Instruction to take.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Prineville Hot Shot Crew

7. HOME ADDRESS (St., City, State, ZIP Code)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Helitach - Gave instructions to helitac to IC no conversation by radio until to helitac - Jumpers already on site.

Crew Needs

Crew wants to know where the communications like broke down with the red flag warning.
 Be sure that jumpers sheltered up
 3 sheltered up and survived
 2 jumpers at Valley View hospital
 - the black was the safety zone towards the safety zone - burned clean

"Told Kelso to head out." Last Communication.

How to get fire behavior information to the HS Supt.
 60 hotshot crews.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

USDA Forest Service		STATEMENT <i>(Reference FSH 5309.11)</i>		1. CASE NUMBER	
2. NATURE OF INVESTIGATION <u>South Canyon Fire</u>					
3. PERSON MAKING STATEMENT (Last, First, Middle) <u>Prineville Hot Shot Crew</u>		4. SOCIAL SEC. NO.		5. DOB	
7. HOME ADDRESS (St, City, State, ZIP Code)		8. DRIVER'S LIC. NO.		9. PHONE (H) (Area Code)	
10. EMPLOYMENT (Occupation and Location)				11. PHONE (W) (Area Code)	
12. LOCATION STATEMENT TAKEN		13. NAME OF OFFICER TAKING STATEMENT		14. DATE/TIME STARTED	
15. STATEMENT <p>Interview taken by Paul Werth</p> <p>Fri AM <u>INTERVIEW: Prineville HS</u> Winds out of west & gusty, no change in sp/air Extremely steep, chimneys Side slope est. 40% 16 jumpers on fire 1st first day, 8 second day. Arrived at helibase 12:12:00. First 9 flew up (Helicopters) 20 to top (north) this was un-burned, southern Helispot burned survivors flew- up later and started time south of helispot fire activity real low, 1200, smoke white. → 1340 winds pick-up, thunderstorm cell to SE, moved North and dissipated, some gusty winds on west. No belt with Kif obs. Set pine/juniper brush No good safety zone * spotted to west across draw (other-side of canyon) probably fishhooked and crossed bottom of draw end up west aspect. * run took only a minute front to east - extremely clear to southwest</p> <p>I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.</p> <p>I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.</p>					
SIGNATURE OF PERSON GIVING STATEMENT				16. DATE/TIME ENDED	
17. OFFICER'S SIGNATURE		18. WITNESS' SIGNATURE (If Applicable)			

USDA Forest Service		STATEMENT (Reference FSH 5309.11)		1. CASE NUMBER	
2. NATURE OF INVESTIGATION					
South Canyon Fire					
3. PERSON MAKING STATEMENT (Last, First, Middle)		4. SOCIAL SEC. NO.		5. DOB	
Prineville Hot Shot Crew				6. SEX	
7. HOME ADDRESS (St., City, State, ZIP Code)		8. DRIVER'S LIC. NO.		9. PHONE (H) (Area Code)	
10. EMPLOYMENT (Occupation and Location)				11. PHONE (W) (Area Code)	
12. LOCATION STATEMENT TAKEN		13. NAME OF OFFICER TAKING STATEMENT		14. DATE/TIME STARTED	
15. STATEMENT					
<p> * 1604 time when major run occurred -1530 winds very strong - thru brush down and blew up - hard to stand against the wind. - Wind just at saddle, then not much wind, and strong winds up to, then turned windy all over * -1600 bucket drop on flare-up on ridge - Major run was a return and moved across slope flanking line - fatalities found up (north) from where they were. 1604 headed back down hill 1730 on road incident over - fuels were burning that normally don't burn. - FL -100 feet, very abnormal fire - Visual indicators, Clouds in 2 winds. - fire 6-700 yards down slope when they ran for safety * - no knowledge of best weather or fire behavior. * - no briefing what so ever * - instruction was to tie with IC - Met with IC at helibase - sudden calm -1600 (smoke pulling west) Bill Baker, Byran Schutlz foreman. </p>					
Sat AM Interview: BLM office Glenwood Springs (Butch/Jim) I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.					
I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.					
SIGNATURE OF PERSON GIVING STATEMENT				16. DATE/TIME ENDED	
17. OFFICER'S SIGNATURE		18. WITNESS' SIGNATURE (If Applicable)			

USDA
Forest Service
STATEMENT
 (Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Prineville Hot Shot Crew

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

- detected night of 4th of July
- met Tues. Morn (5th) to initial attack
- 5th - Jumpers showed up after 5th north of 2nd HS
- Fire jumped initial line that Dutch built
- Fire just creeping - 25A
- problem with both saws, refitted 5 saws that evening for next day
- Strong wind prevented 1 drop on fire - dropped instead on highway side
- requested more resources, possibly HS crew & Helicopter
- 6th - early morning (8-9) hiked back up and tied in with Mackey SJ. SJ had build line from
- talked with Mackey & Rich about what they were doing
- Mackey liked direct attack instead of indirect → dropping line on west side down
- Mackey split SJ
- HS crew came in, foreman agreed to split crew
- turned on NOAA weather radio and listened to broadcast thought about winds & cold front passage punched in on radio and wrote down forecast (just afternoon)

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

**USDA
Forest Service**
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

Shepard, Tom

4. SOCIAL SEC. NO.

5. DOB

6. SEX

7. HOME ADDRESS (St, City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

Prineville IHC - Crew Supt., Prineville, OR

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

IHC Trailer
Prineville, OR

13. NAME OF OFFICER TAKING STATEMENT

Dick Mangan

14. DATE/TIME STARTED

7/18/94

15. STATEMENT

Tom Shepard

Tom brought the Prineville IHC to Colorado from a fire in Central Oregon on July 5. There was a lot of confusion at Grand Junction (4 crews, 1 bus) and no clear intention of what the crew intended to do.

On the morning of 7/6 they were assigned to the South Canyon Fire at Glenwood Springs. They drove to the BLM office but were not expected. Tom had to call Grand Junction dispatch for information on tools, supplies, and radio frequencies. The IHC had 6 radios (Shepard, Scholz, Kelso, Bickett, Simmons, and Alexander).

The crew was diverted from lunch to the helibase, then waited until helicopter 93R finished making bucket drops at 1400 hours.

Tom plus 9 IHC were flown into H2. H1-C. Blanco was in a hurry to get them on the line with the smoke jumpers. At the time the fire was innocent looking, but not dead. Shepard and Blanco went to H1 to talk strategy; tie off west end, don't worry about the east, take the line to I 70 and burn out. Avoid building underslung line.

I have read the foregoing statement consisting of 2 pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

7/18/94

17. OFFICER'S SIGNATURE

18. WITNESS'S SIGNATURE (If Applicable)

USDA
Forest Service
STATEMENT
(Reference FSH 5309.11)

1. CASE NUMBER

2. NATURE OF INVESTIGATION

South Canyon Fire

3. PERSON MAKING STATEMENT (Last, First, Middle)

4. SOCIAL SEC. NO.

5. DOB

6. SEX

Shepard, Tom

7. HOME ADDRESS (St., City, State, ZIP Code)

8. DRIVER'S LIC. NO.

9. PHONE (H) (Area Code)

10. EMPLOYMENT (Occupation and Location)

11. PHONE (W) (Area Code)

12. LOCATION STATEMENT TAKEN

13. NAME OF OFFICER TAKING STATEMENT

14. DATE/TIME STARTED

15. STATEMENT

Tom tried to get a recon. flight, but 93R had returned to making bucket drops. It was after 1500 before the last 10-IHC were flown up the hill to H2.

Tom and IC Blanco briefed Scholz and began brushing line between H1 and H2. Shepard began recon. on a new line to the north. He could look down into the fire from that location.

Squad Leader Kelso called that a spot had crossed the draw below them. Tom told them to come out. He had no sense of urgency from Kelso.

Shortly after that, fire activity increased on the upper portion of the fire due to an increased wind speed and direction change. Tom ordered Scholz and the 9 IHC to H1. They were cut off by the fire, returned to H2. They went out by the main draw to I-70 with Blanco, Shepard, and BLM firefighters.

When Shepard arrived at H2 at 1400, he talked briefly about the weather and fuels. There was no mention of red flag warnings. Tom asked about line fuel moistures, and was told they were low, but no specifics. There was no mention of reburn potential.

I have read the foregoing statement consisting of _____ pages. I fully understand this statement and declare that the foregoing is true, accurate, and complete to the best of my knowledge. I have signed or initialed each and every page and have been given an opportunity to make any corrections or additions.

I made this statement freely and voluntarily, without threats or rewards, or promises of reward having been made to me in return for it.

SIGNATURE OF PERSON GIVING STATEMENT

16. DATE/TIME ENDED

17. OFFICER'S SIGNATURE

18. WITNESS' SIGNATURE (If Applicable)

Appendix 6 — The Investigation

Team Formation

The following chronology shows how members of the South Canyon Fire Accident Investigation Team and cooperating investigators were notified of their selection to serve in the investigation.

July 6

- 6:45 p.m. Dick Mangan, Ted Putnam, and Jim Kautz received a resource order from the Northern Region Coordination Center to investigate the fatalities.
- 10:00 p.m. Mark Reimers was notified by J. Lamar Beasley, Acting Chief of the Forest Service, that he would be the Chief's representative on the Investigation Team.
- 11:00 p.m. Mike Clarkson and Roy Johnson were notified by Al Dunton, BLM Chief of Fire and Aviation, that they would serve on the Investigation Team.

July 7

- 6:30 a.m. Les Rosenkrance was notified by Al Dunton, BLM Chief of Fire and Aviation that he would be the Director's representative on the team. At 7:00 a.m. BLM Deputy Director Denise Meredith confirmed his selection via telephone.
- 7:30 a.m. Sue Husari was notified by Dave Aldrich of the Forest Service Washington Office.
- 8:00 a.m. Paul Werth was notified by NIFC BLM.
- 9:00 a.m. John Graber was notified by the Forest Service Washington Office.
- 10:30 a.m. Jim Webb was notified by the Forest Service Washington Office.

The team first met on July 7 at 10:00 p.m. Rosenkrance, Reimers, Johnson, Clarkson, Husari, Werth, and Webb attended. At 11:00 p.m. BLM Director Mike Dombeck and Forest Service Chief Jack Ward Thomas arrived at the meeting, and the charter for the joint Bureau of Land Management/Forest Service Interagency Investigation Team was discussed. Les Rosenkrance was designated team leader.

Observers

July 7

- early morning Bill Baden arrived at the headquarters of the National Fire Protection Association (NFPA) and was requested to call National Interagency Fire Center (NIFC) by his supervisor and offer his assistance on the investigating team. Steve Robinson, NIFC Assistant Director, responded that NFPA's assistance would be greatly appreciated. Bill Baden and

Mike Isner, NFPA fire investigators, joined the team in a support role.

mid-
morning

Bobby Glover, Area Manager for the Occupational Safety and Health Administration (OSHA) was notified by Caroline Sullivan, Department of Agriculture, and Ronald Wilson, USDA Forest Service, that several fire fighters had died on the South Canyon fire. Later that morning Glover dispatched Paul Bakewell, Stephen J. Yellstrom, and Pete Dailey as compliance officers for the investigation. The OSHA representatives participated with the team as observers but reported that they would be required to conduct a separate investigation and prepare a separate report.

Investigation Sequence

The following chronology presents the main events in the investigation of the South Canyon fire.

July 6 and 7 Team notification and travel

July 7

- 4:00 a.m. Johnson arrives in Grand Junction to establish investigation facilities, obtain support, and get information to brief the team.
- 11:00 a.m. Putnam, Mangan, Kautz, Isner, Martinez, and McShane arrive at fatality site.
- 8:00 p.m. Team's first meeting is attended by Rosenkrance, Reimers, Johnson, Clarkson, Werth, Webb, and Husari. Organizational assignments are made and agreed upon.
- 11:00 p.m. Team presents functional charter to Mike Dombeck and Jack Ward Thomas for their approval. Dombeck and Thomas agree that this investigation will be a joint effort between the USDA Forest Service and the Bureau of Land Management. Rosenkrance is designated team leader.

July 8

- 9:00 a.m. Team holds organizational meeting to determine who will be interviewed and in what priority. Putnam, Mangan, Kautz, Isner, Martinez, and McShane continue their investigation at fatality site. Team receives a signed copy of its charter. First press conference is held in Grand Junction.
- 4:00 p.m. Public affairs, clerical, and recorder support are ordered.

July 9

- 7:30 a.m. Team meets to request more equipment and to follow up on assignments. Clarkson and Webb visit fire site with smoke-jumpers, while Johnson, Husari, and Werth visit site with ground crews. Rosenkrance, Reimers, Mangan, Chief Thomas, and Assistant Secretary of Agriculture Lyons attend

press conference in Glenwood Springs with Secretary of Agriculture Espy. After press conference Rosenkrance and Reimers fly over fire site. Putnam, Isner, and Martinez continue investigation at the fatality site.

July 10

7:30 a.m.

Team meets to discuss progress. Putnam, Isner, and Martinez continue work at fatality site.

7:30 p.m.

Team interviews continue all day. Progress on gathering information is going well.

July 11

7:30 a.m.

Team meets to discuss progress. Putnam, Isner, and Martinez continue their investigation at fatality site. Interviews to continue all day. A proposed interagency alert is sent to NIFC to be issued.

7:30 p.m.

Team discusses interviews.

July 12

7:30 a.m.

Entire team travels to Glenwood Springs to visit fireline, escape routes, fatality sites, deployment areas, safety zones, blowup area, and Helispots 1 and 2. Putnam, Isner, and Martinez complete site analysis and join team in Grand Junction.

July 13

7:30 a.m.

Team meeting. Interviews and analysis continue all day.

7:30 p.m.

Team meeting.

July 14

7:30 a.m.

Team agrees to meet formally only once a day. Interviews and analysis continue.

July 15

7:30 a.m.

Team meets to assess programs and clarify assignments. Team also develops report format and tentative deadlines. Second interagency alert is sent to NIFC.

July 16

7:30 a.m.

Team discusses sequence of fire events. A draft of sequence is due for team review by noon on July 16. Mangan and Baden are scheduled to conduct more interviews in Prineville, OR, on July 18. A partial draft of the Findings section of the report is due at 7:30 a.m. on July 17.

July 17

7:30 a.m.

Team meets and reviews Findings.

4:30 p.m.

Mangan and Baden leave for Prineville.

July 18

7:30 a.m.

Team meets to assess program and review work assignments. Interviews continue.

July 19

7:30 a.m.

Team reviews sequence of events and continues to work on report sections.

South Canyon Fire

July 20

7:30 a.m. Photos are reviewed and logged. Final interviews are completed. Team continues to draft and review report. Mangan and Baden return from Prineville.

July 21

7:30 a.m. Team meets to discuss remaining tasks and establish draft report timeframes.

July 22

7:30 a.m. Final team meeting in Grand Junction. Investigation files to be temporarily housed at BLM Arizona State Office in Phoenix.

July 27

8:00 a.m. Rosenkrance, Johnson, and Clarkson meet with some support team members in Phoenix to work on Incident Overview.

July 28

8:00 a.m. Meeting continues in Phoenix.

August 9

8:00 a.m. Team meets in Phoenix to complete investigation report and transmittal letter.

August 10

7:00 a.m. Team meeting in Phoenix continues.

August 11

7:30 a.m. Team meeting in Phoenix concludes.

August 17

10:30 a.m. Rosenkrance and Reimers present the team's reports to the Director of BLM and Chief of the Forest Service in Washington, D.C.

Team Members

The following list gives the names and titles of the members of the South Canyon Fire Accident Investigation Team, observers on the investigation, and the Principal Support Team.

South Canyon Fire Accident Investigation Team

Les Rosenkrance
Arizona State Director
Bureau of Land Management
Phoenix, AZ

Mark A. Reimers
Deputy Chief—Programs and Legislation
USDA Forest Service
Washington, D.C.

Roy A. Johnson
Fire Management Specialist
Bureau of Land Management
National Interagency Fire Center
Division of Fire and Aviation Policy and Management
Boise, ID

Jim Webb
Forest Supervisor
USDA Forest Service
Monte Vista, CO

John H. Graber
Safety and Health Manager-Union Rep. (NFFE)
USDA Forest Service
Milwaukee, WI

Mike Clarkson
Bureau of Land Management
National Interagency Fire Center
Division of Fire and Aviation Policy and Management
Chief, Branch of Smokejumper Management
Boise, ID

Paul Werth
Fire Weather Meteorologist
National Weather Service
Boise, ID

Sue Husari
Assistant Director for Fuels
Fire and Aviation Management
USDA Forest Service
San Francisco, CA

Dick Mangan
Fire and Aviation Program Leader
USDA Forest Service
Technology and Development Center
Missoula, MT

Ted Putnam
Equipment Specialist
USDA Forest Service
Technology and Development Center
Missoula, MT

Observers

Paul Bakewell
Assistant Area Director for Safety
Occupational Safety and Health Administration
Denver, CO

Peter Dailey
Safety Compliance Officer
Occupational Safety and Health Administration
Denver, CO

Stephen J. Yellstrom
Industrial Hygienist
Occupational Safety and Health Administration
Denver, CO

Principal Support Team

George Jackson
Equipment Specialist
USDA Forest Service
Technology and Development Center
Missoula, MT

Al Martinez
Regional Safety and Health Manager
USDA Forest Service, Region 2
Golden, CO

Dave Goens
Fire Weather Forecaster
National Weather Service
Salt Lake City, UT

Jim Kautz
Audio Visual Production Specialist
USDA Forest Service
Technology and Development Center
Missoula, MT

Elena Miller
Information Receptionist
USDA Forest Service, Boise National Forest
Lowman Ranger District
Lowman, ID

LuAnn Waida
Agreements Specialist
USDA Forest Service, Region 2
Lakewood, CO

Bill Baden
Senior Fire Service Specialist
National Fire Protection Association
Quincy, MA

Mike Isner
Fire Investigator
National Fire Protection Association
Quincy, MA

Beth Roetzer
Visual Information Specialist
Bureau of Land Management
Arizona State Office
Phoenix, AZ

Joanie Losacco
Deputy State Director, External Affairs
Bureau of Land Management
Arizona State Office
Phoenix, AZ

Lucy Ontiveros
Staff Assistant
Bureau of Land Management
Arizona State Office
Phoenix, AZ

June Clay
Staff Assistant
Bureau of Land Management
National Training Center
Phoenix, AZ

George Nelson
National Training Coordinator
Bureau of Land Management
National Training Center
Phoenix, AZ

South Canyon Fire

Ken McGinty
Writer-Editor
Bureau of Land Management
National Training Center
Phoenix, AZ

Daniel James Jiron
Public Affairs Officer
USDA Forest Service
Pueblo, CO

Rem Hawes
Public Affairs
Bureau of Land Management
Arizona State Office
Phoenix, AZ

Ken Smith
Public Affairs
Bureau of Land Management
Canon City District
Canon City, CO

Trey Holt
Garfield County Coroner
Glenwood Springs, CO

Terry McShane
Carbondale Fire Department
Carbondale, CO

Other Contributors To The Investigation

The Investigation Team wishes to acknowledge and thank the following people for contributing to this investigation their photographs and video-tapes of the fire.

Photographs

Sabinio Archuleta
Missoula, MT

Bill Baker
Prineville, OR

Gary Benavidez
Missoula, MT

Debbie Dinelli
Glenwood Springs, CO

Sarah Doehring
Missoula, MT

Bruce Meland
Bend, OR

Tony Petrelli
Missoula, MT

Jo Temple
Glenwood Springs, CO

Video Tape

Allen Bell
Glenwood Springs, CO

Appendix 7 — Firefighters Assigned To The South Canyon Fire On July 6, 1994

Smokeyjumpers Jumped 7-5-84, Aircraft 490as

- | | |
|----------------------|------------------|
| 1. Don Mackey | Jumper in Charge |
| 2. Sarah Doehring | Crew Member |
| 3. Keith Woods | Crew Member |
| 4. Quentin Rhoades | Crew Member |
| 5. Sonny Soto | Crew Member |
| 6. Sabinio Archuleta | Crew Member |
| 7. Eric Shelton | Crew Member |
| 8. Kevin Erickson | Crew Member |

Smokeyjumpers Jumped 7-6-94, aircraft 117BH

- | | |
|---------------------|------------------|
| 1. Eric Hipke | Crew Member |
| 2. Bill Thomas | Crew Member |
| 3. Tony Petrelli | Crew Member |
| 4. Dale Longanecker | Jumper in Charge |
| 5. Michael Cooper | Crew Member |
| 6. Mike Feliciano | Crew Member |
| 7. Roger Roth | Crew Member |
| 8. James Thrash | Crew Member |

Prineville Interagency Hot Shot Crew

- | | |
|--------------------|----------------|
| 1. Tom Shepard | Superintendent |
| 2. Jon Kelso | Squad Leader |
| 3. Kathi Beck | Crew Member |
| 4. Scott Blecha | Crew Member |
| 5. Levi Brinkley | Crew Member |
| 6. Bonnie Holtby | Crew Member |
| 7. Rob Johnson | Crew Member |
| 8. Tami Bickett | Squad Leader |
| 9. Doug Dunbar | Crew Member |
| 10. Terri Hagen | Crew Member |
| 11. Tom Rambo | Crew Member |
| 12. Alex Robertson | Crew Member |
| 13. Kip Gray | Crew Member |
| 14. Mike Simmons | Squad Leader |
| 15. Bill Baker | Crew Member |
| 16. Brian Lee | Crew Member |
| 17. Tony Johnson | Crew Member |
| 18. Louie Navarro | Crew Member |
| 19. Kim Valentine | Crew Member |
| 20. Brian Scholz | Crew Member |

South Canyon Fire

Firefighters Dispatched From Grand Junction Dispatch

1. Butch Blanco	Incident Commander	BLM
2. Derek Brixey	Crew Member	BLM
3. Brad Haugh	Crew Member	BLM
4. Todd Abbott	Crew Member	BLM
5. Eric Christianson	Crew Member	BLM
6. Loren Paulson	Crew Member	FS
7. Brian Rush	Crew Member	FS
8. Jim Byers	Crew Member	BLM
9. Mike Hayes	Crew Member	BLM
10. Neil Shunk	Crew Member	BLM
11. Michelle Ryerson	Squad Leader	BLM

Helitack Crew

12. Rich Tyler	Helicopter Mgr.	H-2	BLM
13. Robert Browning	Crew Member	H-2	FS

Firefighters Stationed At South Canyon Estates Helibase

14. Bruce Dissell	Crew Member	BLM
15. Steve Little	Crew Member	FS
16. Pat Medina	Crew Member	FS
17. Brian Cardoza	Crew Member	BLM

Interstate 70 - Guard

18. Janie Jarrett	Crew Member	BLM
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Appendix 8 — Firefighter Qualifications

Name

*Qualifications

BLM/FS Firefighters

Butch Blanco	ICT3, STCR, CRWB, ENGB
Brad Haugh	FFT2, ENOP
Loren Paulson	FFT2, FALC, SQDB
Brian Rush	FFT2, SQDB
Jim Byers	ICT4, STDZ, STCR, CRWB
Mike Hayes	FFT2
Neil Shunk	FFT2
Michelle Ryerson	FFT2
Rich Tyler	FFT1, SQDB, EMTB
Robert Browning	FFT2, ENOP, ENGB, HECM
Bruce Dissell	ENGB, HESM
Steve Little	FFT2, HECM, ENOP
Pat Medina	FFT2, HECM, HESM
Brian Cardoza	FFT2, CRWB
Janie Jarrett	FFT2

Smokejumpers

Don Mackey	CRWB, FALC
Sarah Doebling	SQDB
Keith Woods	SQDB
Quentin Rhoades	SQDB, FALC
Sonny Soto	SQDB
Sabinio Archuleta	STCR, HESM, HEB1, HEM1
Eric Shelton	ICT4, SQDB, FALC
Kevin Erickson	CRWB, FALC, SMJ
Eric Hipke	FFT2, SMJ
Bill Thomas	DIVS, EMT1
Tony Petrelli	CRWB, FALC
Dale Longanecker	STCR, TFLD, FALC, FELB
Michael Cooper	ICT4, CRWB, FALB, SMJ
Mike Feliciano	FFT1, FALB, SMJ
Roger Roth	FFT1, FALB, SMJ
James Thrash	ICT4, CRWB, FALB, SMJ

*See the following listing of ICS positions.

South Canyon Fire

Prineville Interagency Hotshot Crew

Tom Shepard	DIVS, STEN, FALC
John Kelso	FFT1, SQDB
Kathi Beck	FFT1, SQDB
Scott Blecha	FFT2
Levi Brinkley	FFT2
Bonnie Holtby	FFT2
Rob Johnson	FFT2
Tami Bickett	FFT2
Doug Dunbar	FFT2
Terri Hagen	FFT2
Tom Rambo	FFT2
Alex Robertson	FFT2
Kip Gray	FFT2
Mike Simmons	CRWB, ENGB, FFT1, FALB
Bill Baker	FFT2
Brian Lee	FFT2
Tony Johnson	FFT2
Louie Navarro	FFT2
Kim Valentine	FFT2
Brian Scholz	CRWB, SQDB, FFT1

List of ICS Positions

ICS Positions and Mnemonics

- Area Commander (ACDR)
- Area Command Logistics Chief (ALCL)
- Area Command Planning Chief (ACPC)
- Agency Representative (AREP)
- Air Operations Branch Director (AOBD)
- Air Support Group Supervisor (ASGS)
- Air Tactical Group Supervisor (ATGS)
- Air Tanker/Fixed Wing Coordinator (ATCO)
- Base/Camp Manager (BCMG)
- Claims Specialist (CLMS)
- Commissary Manager (CMSY)
- Communications Unit Leader (COML)
- Compensation/Claims Unit Leader (COMP)
- Compensation-for-Injury Manager (INJR)
- Cost Unit Leader (COST)
- Demobilization Unit Leader (DMOB)
- Display Processor (DPRO)
- Division/Group Supervisor (DIVS)
- Documentation Unit Leader (DOCL)
- Equipment Manager (EQPM)
- Equipment Time Recorder (EQTR)
- Facilities Unit Leader (FACL)

Field Observer (FOBS)
Finance/Administration Section Chief Type 1 (FSC1)
Finance/Administration Section Chief Type 2 (FSC2)
Food Unit Leader (FDUL)
Ground Support Unit Leader (GSUL)
Helibase Manager 1-3 (HEB2)
Helibase Manager 4+ (HEB1)
Helicopter Coordinator (HLCO)
Helicopter Crewmember (HECM)
Helicopter Manager (HEMG)
Incident Commander Type 1 (ICT1)
Incident Commander Type 2 (ICT2)
Incident Commander Type 3 (ICT3)
Incident Commander Type 4 (ICT4)
Incident Communications Manager (INCM)
Interagency Resource Representative (IARR)
Information Officer Type 1 (IOF1)
Information Officer Type 2 (IOF2)
Information Officer Type 3 (IOF3)
Liaison Officer (LOFR)
Logistics Section Chief Type 1 (LSC1)
Logistics Section Chief Type 2 (LSC2)
Medical Unit Leader (MEDL)
Operations Branch Director (OPBD)
Operations Section Chief Type 1 (OSC1)
Operations Section Chief Type 2 (OSC2)
Ordering Manager (ORDM)
Personnel Time Recorder (PTRC)
Planning Section Chief Type 1 (PSC1)
Planning Section Chief Type 2 (PSC2)
Procurement Unit Leader (PROC)
Receiving/Distribution Manager (RCDM)
Resource Unit Leader (RESL)
Safety Officer (SOF1)
Safety Officer (SOF2)
Security Manager (SECM)
Service Branch Director (SVBD)
Situation Unit Leader (SITL)
Strike Team Leader Dozer (STDZ)
Strike Team Leader Crew (STCR)
Strike Team Leader Engine (STEN)
Strike Team Leader Tractor/Plow (STPL)
Staging Area Manager (STAM)
Status/Check-in Recorder (SCKN)
Supply Unit Leader (SPUL)
Support Branch Director (SUBD)
Task Force Leader (TFLD)
Time Unit Leader (TIME)

Skill Positions and Mnemonics

Wildfire Skill Positions

Advanced Firefighter/Squad Boss (FFT1)
Crew Representative (CREP)
Crew Boss (Single Resource) (CRWB)
Dozer Boss (Single Resource) (DOZB)
Engine Boss (Single Resource) (ENGB)
Felling Boss (Single Resource) (FELB)
Firing Boss (Single Resource) (FIRB)
Fire Behavior Analyst (FBAN)
Firefighter (FFT2)
Infrared Interpreter (IRIN)
Tractor/Plow Boss (Single Resource) (TRPB)
Training Specialist (TNSP)

Expanded Dispatch Skill Positions

Coordinator (CORD)
Dispatcher Recorder (EDRC)
Supervisory Dispatcher (EDSP)
Support Dispatcher (EDSD)

Appendix 9 — Investigation Team Charter



U.S. Department of the Interior
Bureau of Land Management
Washington, D.C. 20240



U.S. Department of Agriculture
Forest Service
Washington, D.C. 20090

SOUTH CANYON FIRE

Accident Investigation

July 12, 1994

This letter supersedes our direction of July 7, 1994. The designated Interagency Accident Investigation (Review) Team of Les Rosenkrance, BLM (Leader); Mark Reimers, USFS; Roy Johnson, BLM; Jim Webb, USFS; John Graber, USFS; Mike Clarkson, BLM; Dave Goens, NWS; Paul Werth, NWS; Sue Husari, USFS; and other representatives are delegated the authority to conduct a joint investigation of the injuries and fatalities that occurred on the South Canyon Fire. The Investigation Team shall serve as a board of investigation under Department of the Interior Department Manual 485, Chapter 7. The team shall:

1. Identify factual data associated with the circumstances relating to the incident.
2. Accurately and objectively record the findings.
3. Analyze the findings to identify the significant factors involved and their relationships.
4. As appropriate, recommend actions that should be implemented immediately to prevent similar future occurrences.
5. Develop and submit a factual report and an investigative report to the Director of the Bureau of Land Management and the Chief, U.S. Forest Service within 45 days of the accident.

A separate Management Review Team will be appointed jointly by the Agency heads to review the accident reports and to develop proposed corrective actions that should be implemented by the agencies to reduce future accidents of this nature.

This action will take place immediately.

MIKE DOMBECK
Director, Bureau of Land Management

JACK WARD THOMAS
Chief, U.S. Forest Service

Appendix 10 — Interagency Alerts 1 And 2

INTERAGENCY ALERT - SOUTH CANYON FIRE

WILDLAND FIRE SUPERVISORS: SHARE THIS INFORMATION WITH ALL EMPLOYEES AND DISCUSS CRITICAL ITEMS AS TO WHAT EFFECT THEY HAVE IN YOUR GEOGRAPHIC AREA.

The 1994 fire season is only half over and there have been at least seven separate entrapments on wildland fire incidents. Prior to the South Canyon fire, firefighters involved in entrapments have experienced relatively minor injuries.

The South Canyon fire tragedy has resulted in the deaths of 14 wildland firefighters. Nine Hot Shot Crew members, three Smokejumpers and two Helitack Crew members were killed on the incident.

CRITICAL FACTORS

FUELS AND WEATHER

1. Extreme weather conditions consisting of high temperatures and low relative humidities.
2. Low dead fuel moisture, and extremely low live fuel moisture.
3. Strong wind events. Pay attention to "RED FLAG WARNINGS".

FIRE BEHAVIOR IS SO EXTREME THAT THE TIME FRAMES FOR DECISION MAKING ARE VERY SHORT.

STRATEGY AND TACTICS: Remember the basics, establish a secure anchor, and flank your fire from your anchor. FRONTAL ATTACK IN THESE CONDITIONS IS TOO RISKY!

If you can't clearly see the fire edge, assign a lookout who can see all areas of the fire with potential.

Communications are critical. You must be able to talk with your crew and adjacent crews. Each crew must have access to operational and fire weather information.

Designating your fire lines as an escape route is not enough. Factor your travel time in escape situations. Steep slopes and loose soil on many fire lines slows your escape. Ensure your escape route will get you out of potential trouble in time.

The safety zone you select must offer protection from direct flames and high levels of radiant heat. Be sure it is big enough for everyone who intends to use it. Medium size heliports are often not adequate.

Consider the potential for reburn in areas that appear black and safe. If an area doesn't have a good safety zone, either build one or don't go in.

REVIEW AND IMPLEMENT

10 FIRE ORDERS

18 SITUATIONS THAT SHOUT "WATCH OUT"

L.C.E.S.: Lookout, Communications, Escape route, Safety zones

WORK/REST and LENGTH OF ASSIGNMENT GUIDES

PERSONNEL NUTRITION AND WEATHER REQUIREMENTS

NO WILDLAND FIRE, EVEN THOSE THAT THREATEN STRUCTURES OR IMPROVEMENTS, IS WORTH RISKING DEATH OR INJURY.

INTERAGENCY ALERT- SOUTH CANYON FIRE

The interagency team investigating the South Canyon fire tragedy will release a report to the Chief of the Forest Service and the Director of the Bureau of Land Management in August. The primary purpose of this Alert is to provide information that will help other firefighters avoid similar situations. In light of this, the interagency team strongly recommends that each fire manager review the four major common denominators of fire behavior on tragedy fires:

1. Most incidents happen on smaller fires or on isolated sections of larger fires.

The South Canyon fire was initially a small, relatively inactive fire.

2. Flare-ups generally occur in deceptively light fuels, such as grass, herbs and light brush.

The fuels on the South Canyon fire were either pinyon-juniper with a grass understory or oak brush. These fuels are light and reacted quickly to an increase in wind speed. Very rapid intense spread occurred in underburned oakbrush.

This is an active fire season. It is essential that firefighters dispatched to fires in areas of the country far from their homes be provided with information about the burning characteristics of fuels in the local area.

3. Most fires are innocent in appearance before unexpected shifts in wind direction and or speed result in "flare ups". In some cases, tragedies occur in the mop-up stage.

The South Canyon was relatively inactive until the wind speed increased. At this time it became active quickly and reached "blow-up" intensity very rapidly. The South Canyon fire moved up-slope in some areas as rapidly as 18.5 miles per hour.

4. Fires respond to large and small scale topographic conditions, running uphill suprisingly fast in chimneys, gullies, and on steep slopes.

The South Canyon fire moved rapidly upslope. The most extreme fire behavior occurred where wind was channeled by saddles, gullies and other topographic features.

The South Canyon Fire at the time of the "blow-up" affected 50 firefighters in several separate locations. All were in very hazardous situations. Those firefighters who died were directly in the path of the flames. Other fire fighters were able to use escape routes and reach safety. Eight fire fighters deployed fire shelters within the fire area and survived their entrapment.

CONTINUE TO STRESS

10 STANDARD FIRE FIGHTING ORDERS
AND
18 SITUATIONS THAT SHOUT "WATCH OUT"

Appendix II — Fire Suppression Work-Rest Guidelines

United States
Department of
Agriculture

Forest
Service

Washington
Office

14th & Independence SW
P.O. Box 96090
Washington, DC 20090-6090

Reply to: 5100/6700

Date: May 24, 1993

Subject: Fire Suppressions Activity Work-Rest Guidelines

To: Regional Foresters and Area Director

Enclosed are the Work-Rest Guidelines to be used for fire suppression activities. Fire suppression is an emergency activity, but Forest Service policy sets the first priority for the safety of the individuals involved. It is imperative that Forest Service and other applicable standards are not violated or compromised. The guidelines are consistent with existing standards, and they generally provide a margin of safety for extended operations and physically and mentally demanding situations. Used in conjunction with the other applicable standards, they provide line officers and supervisors with room for making decisions based on the specific situations that provide for safety.

Please see that these guidelines are given broad distribution to all employees who may be involved with fire suppression activities.

/s/ John W. Chambers (for)

RICHARD ADAMS, Acting Director
Fire and Aviation Management

Enclosure

cc: Dick Stauber
Ron Wilson
Bill Bradshaw
Fire Operations
Engineering

I concur: D.Aldrich 05/17/93I concur: N.Steward 05/17/93I concur: R.Joens
05/17/93I concur: Z.Humes 05/19/93

FS:SPF:F&AM:D.ALDRICH:nms:1Correspondence Operation:05-17-93:202-205-1489

FIRE SUPPRESSION WORK-REST GUIDELINES
MAY 1993

Work-rest management of crews, overhead and support personnel to assure safe, productive fire suppression activities is a basic responsibility of fire management personnel. Utilize the following guidelines in decision making to assure adequate rest for fire suppression personnel:

1. Plan for and ensure a 2 to 1 work-rest ratio. Provide 1 hour of sleep/rest for every 2 hours of work/travel.

2. Plan for a minimum fire assignment length of 14 days within the "Lower 48", and 21 days going to or coming from Alaska. Maximum length assignment will not exceed 21 days, unless justified in writing by the Incident Commander and approval for further involvement is received from the firefighters home unit. The maximum assignment for certain State crews is limited through agreements to 14 days plus travel time.

3. Provide a minimum of 1 full day's rest in every 14 day assignment, and 2 full days' rest in every 21 day assignment to continuous suppression activity. If AD crews are released at the end of a 14 day assignment, rest and recuperation (R&R) will not normally be provided.

4. Provide personnel a minimum of 24 hours of rest for sleep and personal services following extended fire suppression assignment before mobilizing to another fire.

5. When dispatched or assigned to emergency situations the following driver restrictions applies to the first day:

Personnel having driving responsibilities will not exceed a shift length of 15 hours of which no more than 10 hours may be actual driving time. All work shifts must be followed by a minimum of 8 consecutive hours in non-duty status.

6. Driving associated with an emergency situation after the initial 24 hour period should be in compliance with the Forest Service Health and Safety Code Handbook (FSH 6709.11).

7. When days off are planned, arrange for R&R facilities that provide for the following:

- a. Eight (8) hours of uninterrupted sleep.
- b. Facilities for showering and washing clothes.
- c. Commissary or other sources of essential items.
- d. Access to a public telephone for personal calls.
- e. Recreational opportunities such as television and video movies may be provided where practical.

8. Rest and recuperation sites that provide the above needs at the least cost to the government should be selected.

9. Performance evaluations and ratings of overhead, crews and support personnel should evaluate performance of work-rest responsibilities as defined by these guidelines.



Appendix 12 — Fire Entrapment Investigation and Review Guidelines





NATIONAL WILDFIRE COORDINATING GROUP

Memorandum

July 27, 1993

To: NWCG Members

From: Chair, NWCG

Subject: Fire Entrapment Investigation and Review Guidelines

At the January, 1993 meeting, NWCG approved the Fire Entrapment Investigation and Review Guidelines prepared by the Safety and Health Working Team, subject to some editorial changes. Those changes have been completed as attached. The intent of the Guidelines is to obtain standardized data to assist in identifying trends and determining preventative measures for the benefit of all. They are not intended to replace agency protocol or to compromise any agency prerogatives.

NWCG recommends that each member review existing direction regarding investigation procedures and subsequent sharing of information resulting from investigation of fire entrapments, then incorporate the guidelines below to the extent possible.

These Guidelines recommend:

- A standard interagency investigation process, procedures and composition.
- Interagency participation on investigation teams.
- Identified channels to communicate findings and mitigation measures.

These guidelines recommend the establishment of Entrapment Investigation Teams. Because of the short time frames to organize such Teams, potential members should be pre-determined by the various Geographic Coordination Groups and reflect interagency composition so far as practicable.

The guidelines also indicate that the Safety and Health Working Team will review each entrapment report and distribute a "sanitized" summary of applicable findings and recommendations to NWCG and the National Fire Protection Association within thirty days of receipt of the investigation report from the appropriate agency administrator, via the "SafetyGram".

Portions of these guidelines, specifically the "Management and Command Responsibilities" and the "Entrapment Investigation Element Matrix", will be added to Chapter 4 (Firefighter Safety) of the NWCG 410-1 "Fireline Handbook" upon its next revision.

NWCG feels that these guidelines will be a viable and useful tool for all participating members.

A handwritten signature in dark ink, appearing to read 'Elmer Hurd', with a stylized, cursive script.

Elmer Hurd

Enc.

FIRE ENTRAPMENT INVESTIGATION AND REVIEW GUIDELINES

PROBLEM STATEMENT:

Since 1976, over 300 shelter deployments and 30 entrapment fatalities have been documented in wildfire suppression operations. In reviewing available injury and fatality investigation reports, it is clear that there are common circumstances that are causal factors throughout the entire wildland fire management community chain of command.

NWCG recognizes that some agencies do an outstanding job of investigating entrapments, implementing corrective recommendations, and distributing findings. However, in some cases, improvements could be made by implementing and following clear investigation criteria, using consistent entrapment review elements, and by wide distribution of findings and recommendations.

These key improvements would noticeably further the prevention of these tragedies and near-miss incidents; without correction of these deficiencies, fire behavior-related injuries and fatalities will continue to occur.

STATEMENT OF PURPOSE:

NWCG hereby recommends guidelines for investigation and review of fire entrapment situations. These guidelines are not intended to replace agency-specific investigation protocol.

The intended purpose for developing these guidelines is to provide standardized data to assist in identifying and analyzing trends. From those trend analyses, preventative recommendations may be made.

These investigation and review guidelines will:

- a. Outline investigation elements, and
- b. Clarify management and command responsibilities.

Through the NWCG Safety and Health Working Team, the review process will:

- c. Provide an effective distribution mechanism of findings, and

- d. Develop a framework for implementation of recommendations.

DEFINITIONS:

Agency Administrator:

That lead employee having responsibility for management of land and/or resources on an organizational unit, and having accountability for overall results of management actions.

Entrapment:

A situation where personnel are unexpectedly caught in a fire behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or have been compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose. These situations may or may not result in injury. They include "near misses"

ENTRAPMENT INVESTIGATION ELEMENTS:

The following elements most commonly contribute to entrapment situations. As a minimum, each of these elements should be addressed in an entrapment investigation and subsequent report, even if the investigation indicates that the element did not contribute to the entrapment. Exhibit I, "Entrapment Investigation Element Matrix", may be utilized to expedite the process.

- I. FIRE BEHAVIOR
 - Fuels
 - Weather
 - Topography
 - Predicted vs. Observed
- II. ENVIRONMENTAL FACTORS
 - Smoke
 - Temperature
 - Visibility
 - Slope
 - Other
- III. INCIDENT MANAGEMENT
 - Incident Objectives
 - Strategy
 - Tactics
 - Safety Briefings/Major Concerns Addressed
 - Instructions Given

- IV. CONTROL MECHANISMS
 - Span of Control
 - Communications
 - Ongoing Evaluations
 - "10 Standard Fire Orders/18 Watchout Situations"
- V. INVOLVED PERSONNEL PROFILES
 - Training/Qualifications
 - Operational Period Length/Fatigue
 - Attitudes
 - Leadership
 - Experience Levels
- VI. EQUIPMENT
 - Availability
 - Performance/Non-performance
 - Clothing and Equipment
 - Used for Intended Purpose?
 - Etc.

MANAGEMENT AND COMMAND RESPONSIBILITIES:

Incident Commander Responsibilities (in addition to those identified in ICS-410-1, "Fireline Handbook"):

Upon notification of an entrapment the Incident Commander should consider:

1. Removing involved personnel from the fireline, ensuring appropriate medical attention as necessary. When hospitalization or fatalities occur, relevant facilities and organizations should be advised to preserve all involved personnel's protective clothing and equipment.
2. Ensuring that the entrapment or deployment scene is secured and that all pertinent evidentiary items are secured (in place if possible), particularly fire shelters and personal protective equipment as required by the Occupational Safety and Health Act.
3. Immediately notifying the Agency Administrator and providing details on the incident status summary (ICS-209).
4. Initiating a preliminary investigation of the entrapment or deployment to determine the facts of the entrapment, insofar as possible. The initial investigation will be completed within 24 hours of the entrapment.

5. Relieving involved supervisors from fireline duty until the preliminary investigation has been completed.
6. Ensuring that personnel and supervisors are readily available for interviews by the Entrapment Investigation Team (EIT, below defined). "Available" means present at the incident base or nearby R&R center.
7. As soon as possible, providing the results of the Incident Commander's preliminary investigation to the Entrapment Investigation Team. Ensure preparation of a roster of individuals involved in the entrapment. The roster must minimally contain their names, employing agency, genders, ages, addresses, incident position titles, and appropriate employee identification numbers.

Agency Administrator Responsibilities:

Upon notification of an entrapment or deployment, the Agency Administrator should assure that the following activities take place within 24 hours of notification:

1. Convene an Entrapment Investigation Team (EIT) to investigate the entrapment. It is recommended that the EIT be interagency in nature and should include personnel with the following skill areas:
 - a. Incident Commander or Operations Section Chief (Type I).
 - b. Fire behavior analysis, qualified in the specific fuel type.
 - c. Safety officer, with investigative expertise.
 - d. Wildfire operations, with expertise at the peer level of the person(s) directly involved.
 - e. Agency representative of involved person(s).
 - f. Employee representation (union, peer at operations level)
 - g. Fire weather meteorology.
 - h. Personal protective equipment specialist, from a lab such as the USDA-Forest Service's Missoula Technology and Development Center.
2. Instruct the EIT to arrive on scene within 24 hours.

3. Advise the Incident Management Team of the EIT's time of arrival and team composition.
4. As required by the Occupational Safety and Health Act of 1970, advise the nearest office of the Occupational Safety and Health Administration (federal or state as applicable) if the entrapment involves a fatality or the hospitalization of 5 or more personnel. Advise OSHA office that a formal investigation is being conducted by a designated Entrapment Investigation Team.
5. Arrange for a critical incident stress debriefing team for the personnel involved in the entrapment.
6. Notify the home unit agency administrator of all individuals involved in the entrapment/deployment.
7. Submit a copy of the EIT's final report to the NWCG Safety and Health Working Team within 60 days of receipt from the EIT.

Entrapment Investigation Team Responsibilities:

1. The EIT will conduct the investigation, identify causal factors and list findings for the entrapment situation. Recommendations for corrective actions should be included in the letter of transmittal.
2. The EIT will brief the Agency Administrator and the Incident Commander of their preliminary findings prior to leaving the incident.
3. Within 30 days of the EIT's dispatch, the EIT's final report and recommendations for corrective actions will be submitted to the Agency Administrator.

NWCG Safety and Health Working Team (SHWT) Responsibilities:

1. Within 30 days of receipt of each entrapment report, the SHWT will distribute a summary of the applicable findings to NWCG agencies and the National Fire Protection Association, per the NWCG "Safety Gram". This summary will not include any incriminating agency references or information identified as sensitive by the agency.
2. The SHWT will periodically review all entrapment reports, determine trends, and incorporate findings to develop specific prevention recommendations for implementation by NWCG agencies.

ENTRAPMENT INVESTIGATION ELEMENT MATRIX

Did Not Contribute

*Influenced

*Significant Contribution

I. FIRE BEHAVIOR

Fuels
Weather
Topography
Predicted vs. Observed

II. ENVIRONMENTAL FACTORS

Smoke
Temperature
Visibility
Slope
Other

III. INCIDENT MANAGEMENT

Incident Objectives
Strategy
Tactics
Safety Briefings/Major Concerns
Addressed
Instructions Given

IV. CONTROL MECHANISMS

Span of Control
Communications
Ongoing Evaluations
"10 Standard Fire Orders/18
Watch-out Situations"

V. INVOLVED PERSONNEL PROFILES

Training/Quals/Physical Fitness
Operational Period Length/Fatigue
Attitudes
Leadership
Experience Levels

VI. EQUIPMENT

Availability
Performance/Non-Performance
Clothing and Equipment
Used for Intended Purpose?

** Element items must be supported with written documentation.

ENTRAPMENT INVESTIGATION ELEMENT MATRIX

Did Not Contribute

• Influenced

• Significant Contribution

I. FIRE BEHAVIOR

Fuels
Weather
Topography
Predicted vs. Observed

II. ENVIRONMENTAL FACTORS

Smoke
Heat
Other

III. INCIDENT MANAGEMENT

Incident Objectives
Strategy
Tactics
Safety Briefings/Major Concerns
Addressed

IV. CONTROL MECHANISMS

Span of Control
Communications
Ongoing Evaluations
"10 Standard Fire Orders/18 Watch-out Situations."

V. INVOLVED PERSONNEL PROFILES

Training/Qualifications/Physical Fitness
Operational Period Length/Fatigue
Attitudes
Leadership
Experience Levels

VI. EQUIPMENT

Availability
Performance

* Element items must be supported with written documentation.

(Exhibit 1)



Glossary

Aerial Fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches and crowns, snags, moss, and high brush.

Air Tanker: A fixed-wing aircraft equipped to drop fire retardants or suppressants.

Anchor Point: An advantageous location, usually a barrier to fire spread, from which to start building a fireline. An anchor point is used to reduce the chance of firefighters being flanked by fire.

Aramid: The generic name for a high-strength, flame-resistant, synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.

Aspect: Direction toward which a slope faces.

Backing Fire: Fire spreading against the wind or downslope. A fire spreading on level ground without wind is a backing fire.

Behave: A system of interactive computer programs for modelling fuel and fire behavior. BEHAVE consists of two systems: BURN and FUEL.

Blowup: A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blowups are often accompanied by violent convection and may have other characteristics of a fire storm. See FLAREUP.

Bucket Drops: The dropping of fire retardants or suppressants from specially designed buckets carried by helicopter like sling loads.

Bumpup Method: A progressive method of building a fireline on a wildfire without changing relative positions in the line. Work is begun with a suitable space between workers. Whenever one worker overtakes another, all workers ahead move one space forward and resume work on the uncompleted part of the line. The last worker does not move ahead until completing his or her space.

Burning Index: A relative number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a specified fuel type. Doubling the burning index indicates that twice the effort will be required to contain a fire in that fuel type as was previously required, providing all other parameters are held constant.

Burning Out: A type of suppression fire used to widen control lines during line construction or to eliminate unburned fuels inside the control lines after containment.

Chain: A unit of linear measurement equal to 66 feet.

Cold Front: The leading edge of a relatively cold air mass that displaces warmer air. The heavier cold air may cause some of the warm air to be lifted. If the lifted air contains enough moisture, the result may be cloudiness, precipitation, and thunderstorms. If both air masses are dry, no clouds may form. Following the passage of a cold front in the Northern Hemisphere, westerly or northwesterly winds of 15 to 30 or more miles per hour often continue for 12 to 24 hours.

Contain (Confine) A Fire: To take fire suppression action as needed, which can reasonably be expected to keep the fire within established boundaries under prevailing conditions.

Control A Fire: To complete a control line around a fire, any spot fires therefrom, and any interior islands to be saved; burn out any unburned area next to the fire side of the control lines; and cool down all hotspots that immediately threaten the control line until the lines can reasonably be expected to hold under foreseeable conditions.

Control Line: All built or natural fire barriers and treated fire edge used to control a fire.

Crew: An organized group of firefighters under the leadership of a crew leader or other designated official.

Crowning: The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Deployment: See FIRE SHELTER DEPLOYMENT.

Direct Attack: Any treatment of burning fuel, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

Dispatch Center: A facility from which resources are directly assigned to an incident.

Dead Fuels: Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation, dry-bulb temperature, and solar radiation).

Energy Release Component (ERC): The computed total heat released per unit area (British thermal units per square foot) within the fire front at the head of a moving fire.

Engine Crew: Firefighters assigned to an engine. The Fireline Handbook defines the minimum crew makeup by engine type.

Entrapment: A situation in which a fire traps people in a life-threatening position with no, inadequate, or compromised evacuation routes or safety zones. An entrapment may or may not involve deploying fire shelters.

Equilibrium Moisture Content: Moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle reaches equilibrium moisture content, net exchange of moisture between it and its environment is zero.

Extended Attack Incident: A wildland fire that has not been contained or controlled by initial attack forces and for which more firefighting resources are arriving, enroute, or being ordered by the initial attack incident commander.

Extreme Fire Behavior: A level of fire behavior that ordinarily precludes methods of direct control.

Fingers Of A Fire: Long narrow tongues of a fire projecting from the main body of a fire.

Fire Behavior: How a fire reacts to the variables of fuel, weather, and topography.

Fire Behavior Specialist: A person responsible to the Planning Section Chief for establishing a weather data collection system and for developing fire behavior predictions based on fire history, fuel, weather, and topography.

Firefighting Resources: All people and major items of equipment that can or potentially could be assigned to fires.

Fire Front: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

Fire Intensity: A general term relating to the heat energy released by a fire.

Fireline: A linear fire barrier that is scraped or dug to mineral soil.

Fire Load: The number and size of fires historically experienced on a specified unit over a specified period (usually 1 day) at a specified index of fire danger.

Fire Perimeter: The entire outer edge or boundary of a fire.

Fire Shelter: A personal protection item carried by fire fighters that, when deployed, unfolds to form a tent-like shelter of heat reflective materials.

Fire Shelter Deployment: The removing of a fire shelter from its case and using it properly for protection against fire.

Fire Weather: Weather conditions that influence fire ignition, behavior, and suppression.

Flame Depth: The depth of the fire front.

Flame Front: See FIRE FRONT.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity.

Flareup: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blowup, a flareup lasts a relatively short time and does not radically change control plans. See BLOWUP.

Fuel Moisture (Fuel Moisture Content): Water content of a fuel expressed as a percentage of its oven-dry weight.

Fuel Type: An identifiable association of fuel elements of distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Fusee: A colored flare designed as a railway warning device and widely used to ignite suppression and prescription fires.

Ground Fuel: All combustible materials below the surface litter (duff, tree roots, punky wood, organic soil, sawdust) that normally support glowing combustion without flame.

Handline: A fireline built with hand tools.

Head Of A Fire: The side of the fire having the fastest rate of spread.

Helibase: The main location within the general incident area for parking, fueling, maintaining, and loading helicopters. The helibase is usually located at or near the incident base.

Helispot: A temporary landing spot for helicopters.

Helitack Crew: A group of firefighters trained in the technical and logistical use of helicopters for fire suppression.

Hotshot Crew: A highly trained firefighting crew used mainly in building firelines by hand.

Hotspot: A particularly active part of a fire.

Hotspotting: Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

Incident: A human-caused or natural occurrence, such as a wildfire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

Incident Commander (IC): The person responsible for managing all incident operations.

Initial Attack (Action): The first suppression action on a fire.

Lead Plane: Aircraft with pilot used to make dry runs over the target area to check wing and smoke conditions and topography and to lead air tankers to targets and supervise their drops.

Light (Fine) Fuels: Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a timelag of 1 hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Line Scout: A firefighter who determines the location of a fireline.

Litter: Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

National Fire Danger Rating System (NFDRS): A multiple index scheme designed to give fire suppression people and land managers a systematic means of assessing aspects of fire danger on a day-to-day basis.

Nomex: See ARAMID.

Overhead: People assigned supervisory positions, including incident commanders, command staff, general staff, directors, supervisors, and unit leaders.

Perimeter: See FIRE PERIMETER.

Radiant Burn: A burn received from a radiant heat source.

Radiant Heat Flux: The amount of heat flowing through a given area in a given time, usually expressed as calories/square centimeter/second.

Rate Of Spread: The relative activity of a fire in extending its horizontal dimensions, expressed as the rate of increase of the perimeter, rate of increase in area, or rate of advance of its head, depending on the intended use of the information. Rate of spread is generally expressed in chains or acres per hour for a specific period in the fire's history.

RAWS: See REMOTE AUTOMATIC WEATHER STATION.

Relative Humidity (Rh): Percentage of the actual vapor pressure of the air to the saturation vapor pressure; the ratio, expressed as a percentage, of the amount of water vapor in the air compared to the amount the air can hold under the same conditions.

Remote Automatic Weather Station (RAWS): An apparatus that automatically acquires, processes, and stores local weather data for later transmission to the GOES Satellite, from which the data is retransmitted to an earth receiving station for use in the National Fire Danger Rating System.

Reburn: The burning of an area that has been previously burned but that contains flammable fuel that ignites when burning conditions are more favorable; an area that has reburned.

Red Flag Warning: A term used by fire weather forecasters to call attention to weather conditions of limited duration that may result in extreme burning conditions.

Red Flag Watch: A term used by fire weather forecasters to notify using agencies, usually 24 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

Resource Order: An order placed for firefighting resources.

Resources: See FIREFIGHTING RESOURCES.

Retardant: A chemical having a retarding action on fire.

Run (Of A Fire): The rapid advance of the head of a fire with a marked change in fireline intensity and rate of spread from that noted before and after the advance.

Safety Zone (Area Or Island): An area used for escape should the fireline be outflanked or a spot fire cause fuels outside the fireline to make the fireline unsafe.

Scratchline: An unfinished preliminary fireline hastily established or built as an emergency measure to check the spread of fire.

Sizeup (Or To Size Up): The evaluation of (or to evaluate) a fire to determine a course of action for fire suppression.

Slopoover (Breakover): A fire edge that crosses a control line or the resultant fire.

Smokejumper: A firefighter who travels to fires by aircraft and parachute.

Spot Fire: Fire set outside the perimeter of the main fire by flying sparks or embers.

Spotter: In smokejumping, the person responsible for selecting drop targets and supervising all aspects of dropping smokejumpers.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Spot Weather Forecast: A special forecast issued to fit the time, topography, and weather of each specific fire. These forecasts are issued upon request of the user agency and are more detailed, timely, and specific than zone forecasts.

Strategy: The science and art of command as applied to the overall planning and conduct of an incident.

Suppressant: An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when directly applied to burning fuels.

Suppression: All the work of extinguishing or confining a fire, beginning with its discovery.

Surface Fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Tactics: Deploying and directing resources on an incident to meet objectives determined by strategy.

Timelag: Time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after 4 timelag periods.

Torching: The ignition and later flareup of a tree or small group of trees, usually from bottom to top.

Type: The capability of a firefighting resource in comparison to another type. Type I usually means a greater capability due to power, size, or capacity.

Underburn: A fire that consumes surface fuels but not trees or shrubs. See SURFACE FUELS.

Vectors: Directions of fire spread as related to rate of spread calculations (in degrees from upslope).

Western Slope Fire Coordination Center: An interagency organization serving western Colorado and eastern Utah that coordinates the acquisition of firefighting resources; helps establish priorities for these resources; receives and disseminates fire information; calls for and pre-positions smokejumpers; and manages a 500-person fire cache, an air tanker base, a helicopter and a helitack crew.

Wildland Fire (Wildfire): Any fire occurring on land that is essentially undeveloped except for roads, railroads, powerlines and similar transportation facilities.

Wind Vectors: Wind directions used to calculate fire behavior.

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